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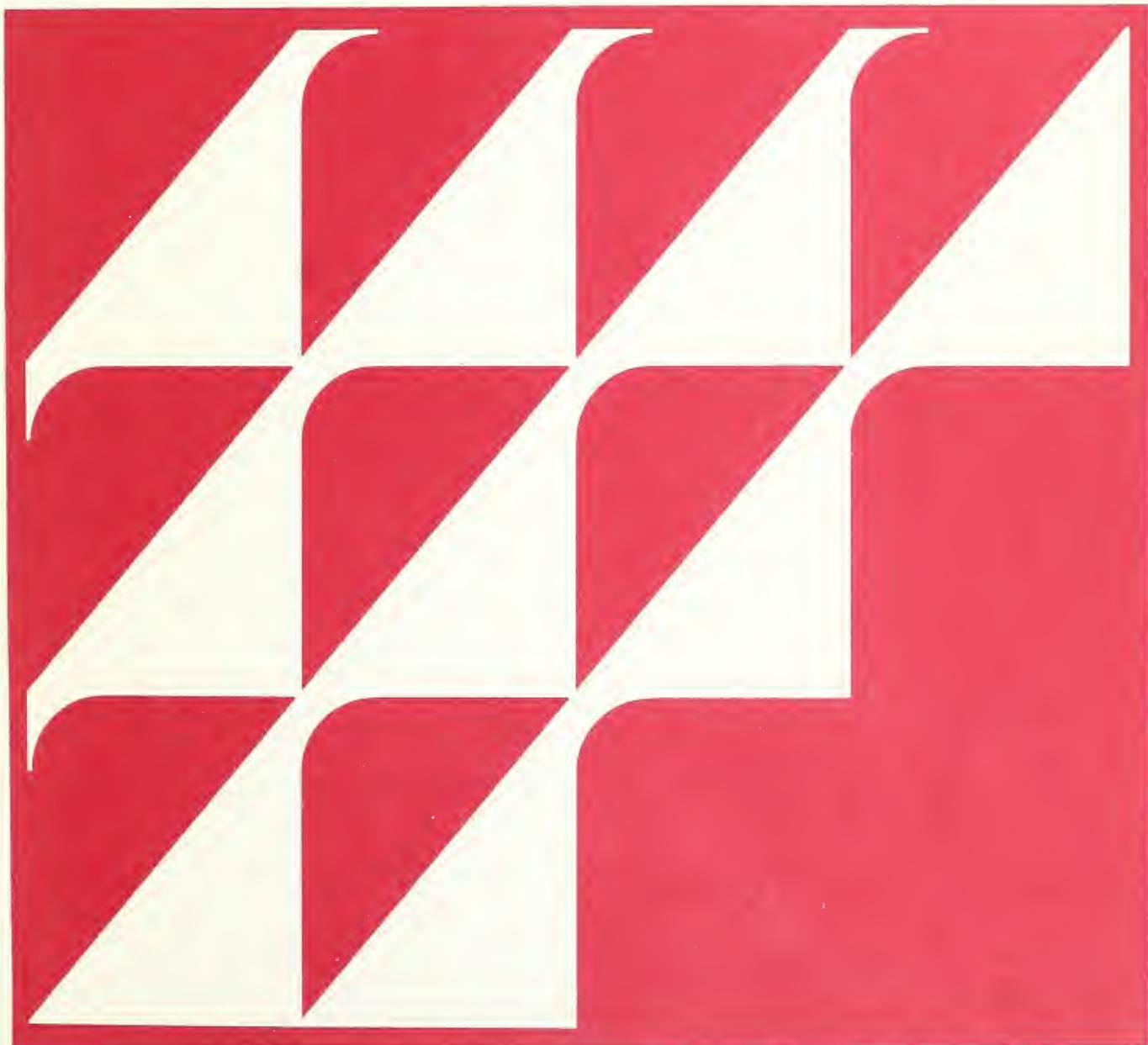Economic
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Food Policies in Developing Countries

Abstract

Developing nations find national food policies a necessary, but not sufficient, condition for economic development, according to this survey of 21 nations, including case studies of Kenya, Tanzania, and Senegal. Use of such policies does not affect development as much as the extent to which they are used. Increasing farmer welfare and achieving national food self-sufficiency were the two food policy objectives most often claimed by the developing nations. Also claimed were consumer welfare, stable prices, conservation of foreign exchange, and food security. Government budget constraints formed the greatest roadblocks to effective food policy.

Keywords: Food policies, agricultural policies, food production, food consumption, food self-sufficiency, food security, marketing controls.

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Preface

This report was produced by a team of economists from the International Economics Division (IED) of USDA's Economic Research Service (ERS) and the Department of Agricultural and Applied Economics of the University of Minnesota. The U.S. Agency for International Development (AID) provided financing.

Charles E. Hanrahan, Deputy Director for Global Analysis, IED, provided overall direction for ERS participation in the project. Shirley Pryor was detailed to AID from ERS and served as project officer for the food policy project and liaison between AID, ERS, and the University of Minnesota. At an intermediate stage, Ray Nightingale (ERS) made a valuable contribution to the project.

ERS' Cathy Jabara and Gary Ender prepared the "Framework for Assessing Food Policies in Developing Countries" section. Carol Goodloe and Edward Wilson (both ERS) prepared the section on "Survey of Policy Objectives and Instruments." Their work was based in part on information supplied by country analysts in the Africa and Middle East, Asia, and Latin America branches of ERS, IED (see listing following Preface).

G. Edward Schuh, Professor and Department Head, provided overall direction for the University of Minnesota's participation in the project. The case studies were prepared by Terry Roe, Professor and Principal Investigator; Jerome Hammond, Professor; Benjamin Senauer, Associate Professor; and Christopher Gerrard, Assistant Professor.

The "Findings and Implications" section was prepared jointly by ERS and the University of Minnesota.

Arthur Dommen (ERS) wrote the "Summary" and prepared the manuscript for editing. James Sayre, Research Information Branch, edited the report for publication.

Jamesena George and Bernadine Holland (ERS) typed the manuscript.

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Contents

Summary

Economically sound policymaking for the agricultural economies of developing countries is a necessary, but not sufficient, condition for development, concludes this study which establishes a framework for assessing the results of food policies. It focuses on the policy instruments commonly used by the governments of developing countries and on the policy objectives stated by these governments.

This framework can help economists and other analysts judge whether a country's policies are helping or hindering its efforts to meet such goals as food self-sufficiency, adequate and stable food consumption, stable food prices, or conservation of scarce foreign exchange. Impacts of policy instruments sometimes may lead to unfortunate results unless governments are prepared to monitor and adjust their use.

This study, featuring a survey of 21 developing countries, reveals a variety of food policy objectives and instruments. Increasing producer welfare and achieving food self-sufficiency are the two objectives of food policy cited most often by governments of developing countries. These two objectives are followed by consumer welfare, stable prices, conserving foreign exchange, and attaining food security.

African countries emphasize self-sufficiency and producer welfare almost to the exclusion of other objectives. Asian countries also cite these two objectives frequently, but generally have a broader range of objectives which include consumer welfare, stable prices, and food security. Producer welfare is also the most important objective for Latin American countries, where there is generally less emphasis on food self-sufficiency. The objectives of consumer welfare and enhancing (or saving) foreign exchange are cited the second most often.

African countries apply production and marketing controls on the widest range of grains and other staples. Tanzania maintains control on practically all commodities it produces, while Botswana controls only corn and sorghum. Asian countries focus production and marketing controls almost exclusively on wheat and rice. In Latin America, controls are distributed fairly evenly among wheat, rice, and corn.

One of the greatest constraints to effective policies is the lack of domestic financial resources, or the budget constraint. This constraint operates in low-income countries like Mali and Tanzania and in middle-income countries like Brazil and Nigeria. This constraint has been a major factor in forcing many African and Asian countries to proceed with serious re-evaluations of the effectiveness of government intervention in the food system and to seek alternative ways of intervening.

The study also features three case studies in which econometric models have been constructed for the food grain sectors of Kenya, Tanzania, and Senegal. All three governments select and implement policies in a manner generally consistent with their announced objective of food self-sufficiency, but with an urban bias. In the cases of Kenya and Tanzania, this objective is better defined as an effort to insulate domestic grain markets from the world market. Senegal faces a somewhat more complicated problem because the attainment of its objective of food grain self-sufficiency directly competes with another objective, that of increasing production of peanuts for export.

The Kenya and Tanzania shortrun response to foreign exchange shortages is generally to reduce imports and to draw down stocks of maize, rice, and wheat. Tanzania's Government also appears to adjust consumer and producer prices to save foreign exchange expenditures on imports. Unpredictable disturbances in supply and demand (such as weather and migration) are handled almost equally through adjustments in imports and stocks, but not through price changes. All three countries regulate wheat prices and imports to influence rice consumption and to encourage domestic markets for other food grains to clear at announced prices.

At official exchange rates, intervention policies in Kenya in 1964-78 amounted to a 13-percent tax on the production of maize, a 35-percent tax on the production of rice, and an 8-percent subsidy on the production of wheat, a crop for which Kenya is a high-cost producer relative to world prices. The implicit tax imposed on export crops is a mere 5 percent. Tanzanian intervention caused greater price distortions than in Kenya. The production of maize in Tanzania is taxed at 24 percent and rice at 36 percent, while wheat production is subsidized by about 15 percent. The production of export crops is taxed at 32 percent. Since production prices for these crops are reflected in related prices in both countries, production taxes amount to consumer subsidies.

Food Policies in Developing Countries

Introduction

This report establishes a framework for assessing food policies in developing countries and describes the most commonly stated policy objectives and the policy instruments most frequently used by governments to attain these objectives. Twenty-one countries in Asia, Africa, and Latin America are surveyed, providing a regional overview and country detail on the nature and extent of government intervention in the food economy by means of price fixing, trade restrictions, credit and input subsidies, and other means. Case studies of three African countries analyze the economic effects of food policies on producers, consumers, and governments.

Government intervention in the food system is a common feature of developing countries.[1] Intervention through tax, credit, trade, and exchange rate policies, as well as direct agricultural price and control measures, is used to redistribute benefits and incentives in ways which are politically acceptable. Government policies influence both the agricultural and other sectors of the national economy.

Definitions

The means used by governments for intervening in the food system are referred to here as instruments. An example is a subsidy on the price to consumers of a staple food like bread. The decision to subsidize the price of bread, however, stems from other considerations of an economic, political, or strategic nature. The decision, then, reflects the deliberate will of the government to use an instrument for a particular purpose. Governments are collectivities, however, rather than monoliths. When we say the will of

the government, therefore, what we really mean is the will of that part or those parts of the government whose power and influence have manifestly succeeded in gaining acceptance of a policy by decisionmakers at the highest level. This policy will be implemented through an instrument, like a subsidy on the price of bread to consumers. But the policy may have originated in a part of the government, such as the Ministry of Finance, that has no direct responsibility for food production or distribution or even the nutritional well-being of its citizens.

Thus, while we speak of food policies, such as providing cheap food to consumers, we recognize that food policies are often elaborated outside the food sector. Indeed, they are frequently not spelled out at all; they remain tacit, but everyone knows what the policy is. This makes the identification of a country's food policy extremely difficult for an outsider. Nevertheless, analysts can usually reach some conclusions, from examining the record of the government's actions and talking to people inside and outside the government, about the broad outlines of the government's goals as they affect the food sector. In the example cited above of the subsidy to the price of bread, the analyst would conclude that the government gave high priority to providing cheap food to consumers. These goals are referred to here as food policy objectives.

Decisionmakers in developing countries have some idea, either expressed or unexpressed, of what policy should be. The policymaking dilemma they face has been described as a constrained maximization problem in which decisionmakers seek to achieve certain goals subject to political, legal, social, and economic constraints (47). Government intervention alters the flow of resources in the economy in order to obtain a resource allocation contributing to stated objectives (45). Different policies can be used to further a variety of objectives; the policy mix chosen, however,

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[1]Government intervention in food markets is also common among developed countries; see (23). This report, however, will focus exclusively on the analysis of such intervention in developing countries. (Italicized numbers in parentheses refer to items listed in References.)

must be consistent with the constraints under which decisions are made.

Organization

The framework set forth in the first section describes the food policy objectives (for example, consumer welfare, income generation for farmers), the food policy instruments (for example, consumer or farm production programs, price controls), and the constraints most commonly encountered. That section also discusses tradeoffs, an important concept in food policy analysis, and factors fostering initiatives to arrive at successful food policies.

Specific policies for groups of developing countries in Africa, Asia, and Latin America are examined in the context of stated food policy objectives in the second section. The extent of government intervention and the likely impacts of policy instruments on the production, consumption, and trade of major grains and other staples are analyzed.

Such a cross-country comparison of objectives and policies is interesting because of the importance of policies in determining profitability of agricultural investments as well as the welfare of consumers, allocation of resources, and direction of trade.[2] Different mixes of policies have different shortrun and longrun impacts, and sometimes affect consumers and producers in opposite ways.

An important problem for developing country policymakers is to find that mix of policies minimizing short-term conflicts between objectives and at the same time leading to promising long-term results. In practice, however, governments in developing countries spend more time adjusting their policy mix than looking for a new policy mix. Thus, the practical problem from their point of view is to determine the level of administered prices, say, in a food subsidy scheme of long standing.[3]

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[2]Because grains like wheat, rice, corn, barley, millet, and sorghum are the most important elements in the diets of people in developing countries, government food and agricultural policies have generally focused on the production, consumption, and trade of these grains.

[3]Governments in developing countries have considerable experience in adjusting administered prices in subsidy schemes in the face of multiple economic, political, and social constraints. Reducing a subsidy on the price of bread, for instance, may not necessarily imply raising the posted price per loaf; the government can choose instead, if it wishes, to reduce the size of the loaf, as happened in Sudan in July 1983.

Consequences of government intervention in the food system are not always apparent at first sight. This is why it is advisable to make a close examination of a country and its food policies before pronouncing judgment on the success or failure or the latter. Three case studies are presented in this report in sufficient detail to permit such judgment to be made.

Framework for Assessing Food Policies in Developing Countries

The interaction of food policy objectives and the policies used by developing countries to achieve them are described and analyzed in this section. Objectives of developing countries' policies, policies used to further these objectives, and tradeoffs inherent in their use are described.

The rationale or need for government intervention in developing countries stems from planners' desires to achieve levels of production, consumption, or trade which would not otherwise be achieved by the private and public sector. Planners may perceive a divergence between the private profitability of a set of activities and its social profitability.[4]

Thus, governments intervene because (1) financial (market) prices often do not reflect true scarcity values (defined in an output maximizing sense) due to imperfections in product, input, or financial markets; and/or (2) governments have objectives different from those of the private sector, resulting in a social valuation of activities different from those reflected in private markets.[5] In either case, government intervention can alter the free market resource allocation toward one which is more socially optimal.

Governments use a range of policies and programs to alter the allocation of resources to meet their objectives. These include consumer and producer programs that subsidize or tax selected activities, concessional foreign trade, direct tax and exchange rate policies, and price or physical controls. Different policies can be used to achieve the same objectives, subject to the political, economic, and physical constraints under which the economy operates.

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[4]Social profitability refers to valuation of an activity in terms of the accounting or shadow prices associated with the activity.

[5]In this case, accounting prices are similar to the dual of a linear programming solution which derives implicit prices from the objective and constraints entered in the program.

Food Policy Objectives

Major objectives of developing country policymakers are usually difficult to identify clearly. Many countries vaguely specify objectives and governments seek to achieve several objectives at the same time. Some idea of government objectives can be gained from official plans or declarations of policy. Other objectives are tacit and must be deduced from the implementation of policies and programs.[6]

Multiple objectives to which governments commit themselves can be conflicting or mutually reinforcing. The dilemma of policy implementation is best conceptualized in terms of the tradeoff between objectives promoting consumer and producer interests, according to Timmer *(45)*.[7] Low real producer prices in many developing countries reflect the dominance of government objectives to protect consumer interests; in this tradeoff, producer interests have definitely lesser priority. There exist, however, longrun policies that will actually improve the situation of both consumers and producers by increasing efficiency within the agricultural sector, as Timmer and others note. In this case, the two objectives of increasing farm income and increasing consumer welfare do not necessarily conflict. A government could subsidize the adoption of improved agricultural technology, leading to both higher farm incomes and greater supplies (and lower prices) to consumers. Thus, whether objectives conflict depends on the timeframe for their achievement and also on the types of policies used to achieve objectives. Objectives like food self-sufficiency and increased farm income are by their nature mutually reinforcing.

Objectives and the emphasis placed on individual objectives change, sometimes frequently. Emphasis on selected goals will vary with the political climate within the country, the domestic agricultural situation, and international events. For instance, after the international grain price instability during 1973-75, many developing countries shifted the focus of their food policy objectives toward food self-sufficiency and domestic price stability. The objectives of food policy can also vary with the stage of economic development of the country.

There are eight most common food policy objectives of developing countries.

Adequate and stable food consumption. The most important, ultimate objective of food policy is usually the provision of adequate caloric intake for the entire population. A well-nourished populace is an intermediate objective of economic development which fosters higher productivity, other things being equal. In terms of food policy, however, adequate nutrition is an end in itself. Governments often implement programs targeted at the malnourished to achieve this objective. But, in a more general way, increased food supplies from whatever source contribute to the attainment of this objective.

Consumer welfare: cheap food. The consumer, as the end link in the food chain which starts with the producer and goes through the trader, transporter, and processor, is the ultimate beneficiary of food policy. In the rural areas of the developing countries, the consumer is also most likely a food producer. In the urban areas, on the other hand, the consumer depends entirely on markets to obtain food for consumption. In these markets, the consumer faces prices which may range from zero to very high levels. Governments have an interest in ensuring that urban consumers pay prices which do not impose hardship or lead to protest against the government's policies.[8]

Producer welfare: income generation for farmers. Some governments seek to increase the returns to agricultural production over what the returns would ordinarily be without government intervention. Many developing countries have

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[6]For example, relative priorities were accorded three rice policy objectives by five West African governments as follows:

	Ivory Coast	Liberia	Mali	Senegal	Sierra Leone
Generation of income	1	1	3	3	1
Distribution of income	2	2	2	2	2
Security of food supplies	3	3	1	1	3

...where 1 indicates highest priority and 3 indicates lowest priority *(30,* p. 370).

[7]Timmer's reference is to Asia, but his observation is generally valid.

[8]Because grains constitute the bulk of food consumption in most developing countries and can therefore be considered wage goods, many governments concentrate their efforts to achieve low-cost food on commodities such as rice, wheat, corn, barley, sorghum, and millet. Developing countries have placed greater importance on this objective than developed countries, according to studies of developing country grain policies *(23, 26, 31)*. Government intervention in the grain sector has tended to subsidize consumption of grains via low producer and consumer prices, these studies show. (In contrast, policies of developed countries have favored both higher producer and consumer prices.)

Wage goods are those on which wage earners spend a significant portion of their income. The cost of these goods, thus, affects the cost of industrial production through wage demands.

given priority to policies designed to increase food production and improve income and living conditions for rural people, particularly since the high price instability in the early seventies. Some countries have implemented policies designed to transfer resources back to agriculture from the urban and government sectors.

Generation of government revenue. Governments sometimes try to raise revenue from the food sector via foreign exchange controls, direct taxation, or coercive procurement. This policy objective has often been implemented with respect to export crops because export taxes are an administratively easy way to raise revenue. Few governments attempt to generate revenue from food crops, because most developing countries are food importers. An exception is Thailand, which taxes exports of both rice and corn.

Generation/conservation of foreign exchange. Developing countries often try to save foreign exchange by reducing expenditures on imported food grains. This objective may be accompanied by measures to increase production of the imported grain. Low-income countries also use concessional imports of food grains to reduce foreign exchange expenditures. Only a few developing countries, such as Thailand, Brazil (1978-79), and Egypt, export grains to generate foreign exchange earnings directly.

Food self-sufficiency. Many developing countries have adopted an objective of food self-sufficiency, many of them during the midseventies in response to the international price uncertainty. Countries are sometimes proclaimed self-sufficient, perhaps falsely, when they do not import grain for a year or two because of favorable harvests, when they import fertilizer or other inputs to produce the crop, or when the caloric and protein needs of the population are not being adequately met, even though grain is not being imported into the country. Reducing reliance on foreign markets almost always implies a domestic price structure for food that differs from world prices; hence, countries can incur large welfare losses from pursuing a self-sufficiency objective. The three countries appearing as case studies in this report have proclaimed food self-sufficiency objectives, and are typical.

Stable domestic food prices. Stable prices can benefit consumers and producers. Poor consumers are most severely hurt by upward fluctuations in food prices, while production incentives and farm income suffer when prices drop below trend. Although prices in most countries move with world prices, one purpose of the stability objective may be to mitigate effects of price fluctuations, allowing consumers to budget their food expenditures and producers to make rational production decisions.

Increased food production. While it is often an objective intermediate to self-sufficiency, higher farm income, or generating/conserving foreign exchange, increased food production can also be pursued as an independent food policy objective, as evidenced by the frequent "Grow More Food Campaigns" in developing countries.

Food Policy Instruments

The selection of instruments is influenced by the physical, financial, and administrative resources available and by the mix of objectives. A particular instrument may further more than one objective, and an objective may be furthered by more than one instrument.

The relationships among food policy objectives and policies are shown in figure 1. Cause-and-effect relationships indicated by arrows in the figure can be either positive or negative. For example, taxation of the agricultural sector enhances government revenue, but simultaneously reduces producers' welfare. Food price subsidies enhance consumer welfare, but represent a drain on the government's effort to generate revenue.

Domestic Policy Instruments

Government marketing interventions include producer price supports, consumer subsidies, public food distribution, and buffer stock operations. This grouping is convenient for analysis because governments which employ one of the policy instruments also tend to become involved with some of the other instruments. Perhaps the most common example of this is a price support program. To have a significant, positive, and guaranteed impact on the harvest price (and thereby on production), a government must be prepared to purchase a substantial amount of grain in the event the free market price drops below the government's announced support price. This grain almost always moves into government storage. Once procurement and storage become part of the government's program, a buffer stock for price stabilization or a ration scheme can be operated to improve consumption of a target group.

Conversely, a government seeking to ensure consumers adequate supplies may store and distribute grain, which may ultimately require domestic procurement. In addition,

Figure 1

Interaction of Food Policy Instruments and Objectives (Circles Represent Instruments; Rectangles Represent Objectives)
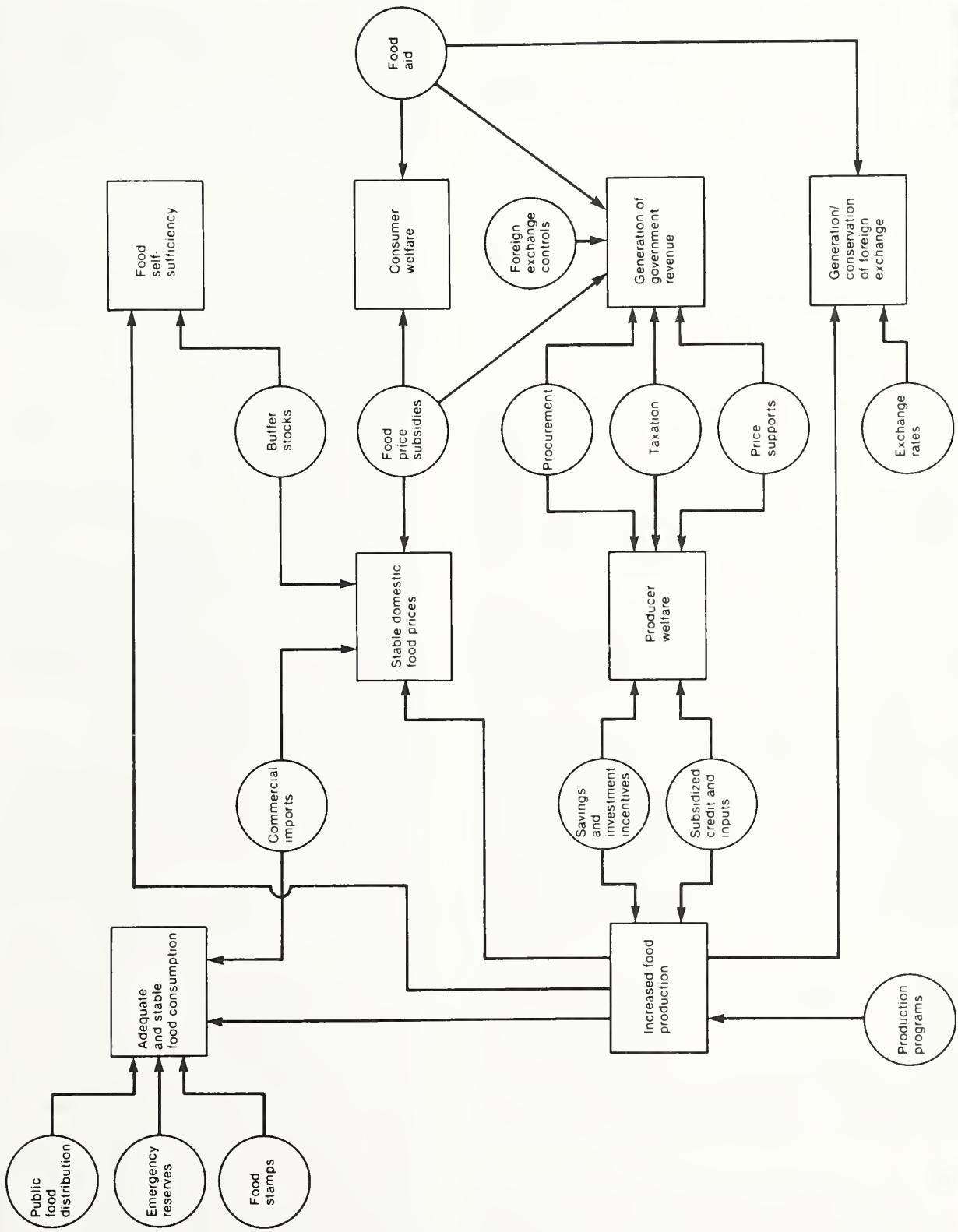
a consumer subsidy can be created if the government release price is less than its marketing costs. Support, subsidy, and storage program costs are often high and direct. However, the social cost of production lost due to prices depressed by food aid, particularly when there is demand creation, might be low and indirect.

Producer price supports are generally used to increase food production in order to meet farm income, foreign exchange, or food security objectives. While price support programs tend to achieve all of these objectives, the latter two have generally been more important than farm income to policymakers in developing countries. Korean rice policy since 1970 is a variation on this theme, in that both self-sufficiency and urban-rural income distribution equity have been very important objectives.

Probably the most widespread form of government marketing intervention in developing countries is the consumer subsidy. The subsidy often has an urban bias, either by design or because of impediments to more extensive implementation in rural areas. The exception is Sri Lanka, which until recently had a ration/subsidy scheme reaching 95 percent of the population.

The direct, regular distribution of food from government to consumer is one way to ensure more consumers of adequate and stable food supplies. It is largely South Asian countries that use this policy instrument, although Indonesia is a notable example from Southeast Asia. Distribution points are located predominantly in urban areas, and the system sometimes relies more on informal than formal rationing. Under informal rationing, certain disincentives (such as location in low-income neighborhoods and long queues) limit the participation of the less needy. In many African countries, procurement is limited by the small proportion of staple production that is marketed. Distribution of food at below-market prices often encourages black markets.

Movement restriction is another domestic policy instrument. India and Pakistan have forbidden the movement of food grains across state lines in several years, stopping movement of surplus supplies and allowing the governments to procure at lower prices than might otherwise have been possible. Such policies also raise prices in deficit areas, some of which may not be served by the distribution program.

Buffer stocks, as distinct from pipeline stocks for distribution or emergency reserves for disaster relief, are even more

an Asian phenomenon. Prices can be stabilized by open market sales from the buffer stock supply. Self-sufficiency could be fostered by a government's adjustment of what it perceived to be a nonoptimal carryover by the private sector, thereby reducing the country's reliance on the international market. Buffer stocks also improve a country's ability to meet consumption targets in the event of production shortfalls. For example, the Government of Korea has sought to control rice prices and consumption within the marketing year with open market sales and across years by retaining a buffer stock. The Association of Southeast Asian Nations (ASEAN) has a rice reserve. While operation of this reserve is currently quite loosely defined (and the stocks quite small), the longrun objective seems to be the establishment of a regional buffer stock.

Food stamps are a consumption-oriented instrument falling outside the category of government marketing interventions. Their unique feature is that they provide assistance to consumers without directly harming producer incentives. Use of this type of program has been restricted to high-income countries such as the United States because of potentially high administrative costs. Continuing its commitment to low-income consumers, however, the Government of Sri Lanka has eliminated the ration system but instituted a "food stamp" program covering several basic commodities, including kerosene. Recipients in this program have substantial flexibility in use of their coupons; they can even put them in the bank.

The government marketing interventions discussed above deal with relatively long-term problems. In contrast, emergency reserves might be held to support short-term disaster relief. In theory, one can distinguish between occasional disasters (and the reserves needed in these cases) and more frequent but more moderate shortfalls in production (and the stocks for them), although in practice this may be difficult. If separating the needs is difficult, separating the stocks is even harder since the same bags of grain and the same buildings are involved in many cases. Thus, countries which have pipeline and/or buffer stocks almost automatically have emergency reserves, although the ideal locations of these three types of stocks could be very different. Probably every country, and especially developing countries with high probability of disasters, would like to have an emergency reserve. In many countries, the idea of an emergency reserve has become a declared policy, but has never been implemented because of a variety of constraints. Regional cooperation is another good idea yet to be put into practice in places such as the Sahel.

Reutlinger, using a simulation model, investigated cost-effectiveness of stocks (33). Costs per ton of buffer stocks increase rapidly after the point when the probability of their use declines rapidly, he points out. Thus, a storage program should generally not be designed to cover all possible contingencies, but rather some reasonable subset of them. Imports can often supplement stocks after a fairly predictable delay.

Another group of domestic policies focuses on increasing food production. These include investment in research, extension, education, irrigation, and expanded or subsidized credit. These instruments are highly complementary. With the exception of subsidized credit, they are largely direct, tangible investments, as opposed to price-based instruments, which may involve significant expenditures but not the creation of public facilities.

Trade Policy Instruments

Regulations relating to foreign trade are essential to government efforts to achieve grain policy objectives because of the often close interrelationship of trade with domestic policies. For instance, government intervention in internal agricultural markets to support domestic objectives often produces internal prices differing from world market prices. Trade restrictions are then required to preserve domestic price levels and to insure orderly marketing of imported and domestically produced commodities. The level of exports or imports depends upon factors such as the degree of protection given to producers, the commitment to provide adequate supplies and stable producer and consumer prices, and the balance of payments position.

Methods employed by governments to regulate grain imports include tariffs/taxes, licensing, imports by state trading agencies or government-authorized monopolies, and exchange rate policies. In cases where grain is state-traded, tariffs and taxes are usually not applied. In some countries, differences in world and internal prices result in a *de facto* variable levy on imports, and revenues (losses) are absorbed by the marketing agency. State trading is the most common form of government intervention in developing countries and is used by countries such as Senegal, Philippines, Sri Lanka, Indonesia, Bangladesh, Tanzania, Sudan, Dominican Republic, Colombia, and Brazil. An exception is Nigeria

which applies licensing procedures and tariffs to grain imports.[9]

Policies of developing countries that restrict trade are symptomatic of an undervaluation of foreign currency in relation to domestic currency, according to Sen, Margolin, and Dasgupta (42). Overvaluation of the domestic currency, which acts as an implicit subsidy to imports and a tax on exports, results from domestic policies or an explicit trade policy. The former case is described for wheat in Egypt by Scobie and Valdes (41). Their study illustrates that, due to domestic policies which subsidize consumption of an imported commodity, the demand for foreign exchange is increased above the free-market level. In the absence of exchange rate adjustments or reserve changes, some mechanism is required to allocate foreign exchange among competing uses. In countries allowing private trade in some grains, like Nigeria, Colombia, and Peru, tariffs are applied to imports to raise revenue as well as to raise import costs.

Brazil has explicity used its exchange rate to affect trade. Brazil kept its exchange rate overvalued during the fifties and sixties in an effort to discourage exports and promote imports of raw materials for its import substitution programs. This policy changed in late 1967 when the cruzeiro was devalued. The cruzeiro again became overvalued during the midseventies, when rising petroleum prices severely affected Brazil's balance of trade.

Most developing countries formulate import targets for food grains that may or may not be fulfilled in any year. Officials use targets to plan adequate imports, based upon expectations of domestic supplies. The level of the import target depends upon the importance of different policymakers' objectives. For instance, a low level of planned imports could save foreign exchange, or further self-sufficiency or farmer welfare objectives. An artificially low import target is a policy instrument which aids governments in increasing producer prices as an incentive to domestic production. The import target can be achieved by limiting the foreign exchange available to the state trading agency or by restricting import licenses.

Concessional food imports, when available, can serve as a policy instrument to save foreign exchange. However, the degree to which foreign exchange is saved depends upon

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[9]In countries where governments subsidize food prices, it is often not profitable for private companies to participate in trade. This is Egypt's case where private traders are permitted to import wheat but the Ministry of Supply actually imports all wheat because of low consumer prices.

whether or not commercial sales are displaced. Several country specific studies of the impacts of concessional sales of wheat (8, 20, 23) have shown that in some countries, such as Brazil and the Republic of Korea, food aid combined with low official prices displaced commercial sales and thus saved current foreign exchange. For other countries, such as Egypt and Tunisia, concessional sales combined with low official prices created additional demand for the commodity, and no commercial sales were displaced. In Tunisia and Egypt, consumption of staple foods is heavily subsidized, so concessional imports are used to fill the demand for wheat at subsidized prices. Concessional food imports play a particularly important role in enabling countries to implement subsidized consumption policies in Bangladesh, Egypt, Tanzania, and Indonesia.

Importing nontraditional grains furthers food policy objectives in a number of ways. Indonesia, the Philippines, Sri Lanka, Colombia, the Dominican Republic, and Senegal import nontraditional grains—wheat or rice—to ensure adequate food for urban consumers. A nontraditional grain like wheat may also be cheaper than the traditional rice.

Constraints

Policymakers, in developing and implementing policies, must consider various constraints that make implementation difficult. Among these constraints are the government budget, administrative capacity, and physical infrastructure.

Budget Constraint

Fiscal resources often limit the ability of a government agency to successfully implement food policies. If programs or projects have minimum feasible sizes, as is often the case, then the paucity of public resources results in policies which might have been complementary becoming mutually exclusive. To increase food production, one ideally might both expand irrigation and support the price of the crop, at least during the initial period. Each of these programs might require a substantial sum, however, especially when production does increase significantly and the price drops. Thus, the policymaker might be constrained to the use of one or the other program, but not both.

Even if there is no minimum feasible size of a program, a lower level of funding (of, say, a buffer stock) will generally result in a less effective or less extensive program. The efficacy of food policy is thus constrained because food policy programs must compete with all other potential government programs for resources.

Administrative Capacity

Administrative capacity—the ability to formulate and implement government programs—is one of the most important factors in the development process because government policies have an important influence on economic growth and development.

The appropriate level of government intervention should be determined to some extent by the domestic capacity to formulate and implement government policies. This capacity is a function of the availability of local human resources and capital. Policymaking capacity, for example, depends upon the quality and quantity of analysts available, constraints on their time, data availability, and general support services such as secretarial help, computers, and computer programmers. The capacity to implement also depends upon quality and quantity of personnel as well as transportation and communication infrastructure.

Administrative capacity is closely related to the level of development and results in a vicious circle: the poorer the country, the less likely it is to have the capacity to formulate and implement those policies which may pull it out of poverty.

Administrative capacity is certainly related to per capita income, but this is not the only factor. Despite its very low per capita income, India has sufficient capacity to develop and implement its agricultural and food policies. Most poor countries in Africa, on the other hand, lack capacity to formulate and implement policies.

This capacity to formulate and implement policies varies from country to country and is likely to be a function of the number of people educated past primary school—the pool of available people for such employment—as well as the size of the government's budget which indicates the ability to support these civil servants in their efforts to develop and implement policies.

Physical Infrastructure

The ability to implement policies depends upon the physical infrastructure. The most important element is likely the quality and extent of the road network. Storing, milling, and processing facilities are also essential factors of food availability.

The physical infrastructure varies from country to country. Simple indicators such as kilometers of roads per square

kilometer are not a sufficient proxy for the adequacy of the infrastructure. The infrastructure in Africa in particular is inadequate. The kinds of achievements made in Asia in increasing agricultural yields with new varieties are presently impossible in Africa because of, among other things, an inadequate transportation system to aid in spreading the new varieties.

Policies and Tradeoffs Among Objectives

Policymakers have a number of policies at their disposal, ranging from commercial or concessional trade to various domestic marketing interventions. Any of these policies has more than one effect; that is, more than one economic interest group is affected, and the consequences may be different in the short and long run.

Even if the best possible policy mix for a given set of objectives and conditions could be found and implemented, the conditions from which policymaking takes its cues are usually changing. Populations grow and migrate; the level, variability, and pattern of production change; new technologies are perfected; and trade opens. Thus, the policymaker must continually restrike the balances among competing interests and conflicting objectives.

Policymakers select policies to meet their objectives. These choices take into account tradeoffs among objectives which are distinct and sometimes even inherently mutually exclusive; self-sufficiency and trade, for example.

Tradeoffs among different objectives in the trade area involve policymakers' decisions to allocate foreign exchange between the agricultural sector and the nonagricultural sector, a free market or government-controlled trade strategy, and expanding trade versus maintaining domestic supplies. The extent of dependence upon foreign trade for food is of major concern to most developing countries. Foreign exchange is often scarce, and decisions must be made to allocate these holdings between food and nonfood imports. Foreign exchange also can be used to import modern inputs like fertilizer and machinery, which may help increase food production.

Decisions to allocate foreign exchange to food or nonfood uses must take into account the political cost of not meeting food consumption requirements (38). Both imports and domestic production are risky, due to uncertainty about production at home and in the rest of the world. Thus, the

amount of foreign exchange allocated to food imports in any one period may prove to be inadequate, and if prices rise significantly, political and/or economic instability may result. In deciding how to use foreign exchange, policymakers must consider the impacts of their decisions on the achievement of various objectives, including adequate food consumption, price stability, increased production, self-sufficiency, and saving foreign exchange, in addition to nonagricultural goals.

Some developing countries have chosen to build food grain reserves to meet food requirements in time of high prices or domestic production shortfalls. Foreign exchange is often required in the construction of centralized storage facilities. In addition, grain may have to be imported to build up reserves if domestic procurement is not possible. A storage strategy, therefore, could be costly in terms of foreign exchange, especially if aid or other development assistance is unavailable. However, reserves allow a country to minimize the use of foreign exchange for food imports by meeting an unexpected shortfall from stocks.

The role of the private and public sectors in trade must also be defined. Domestic pricing policies can limit the scope of a free trade strategy because some control of trade must be maintained if internal prices differ from world prices. Other nonprice policies, like subsidies on inputs, nonprice consumer subsidies, or deficiency payments, do not usually interfere with free trade. Policymakers must weigh the tighter control available to them from state trading against the lower (public) cost of private trading.

Policies used to achieve food self-sufficiency include product price supports, input subsidies, and investments in infrastructure to increase agricultural production. These policies have different shortrun and longrun effects, as Barker and Hayami note (5). Investments in infrastructure usually have long gestation periods, so governments are tempted to adopt shortrun policies such as product price supports and input subsidies. Whether a shortrun or longrun policy is implemented usually depends upon the types of constraints facing government officials. Investment in infrastructure may require large amounts of foreign exchange. In addition, governments may want to increase producer incomes in the short run, and thus decide on a product price support policy.

The choice of food policy instruments also involves tradeoffs between consumer and producer objectives. For instance, the use of a price support could result in higher

prices to consumers, whereas an input subsidy will result in no increase in price to consumers in the short run and a possible fall in product prices in the long run. Although high product prices will hurt consumers in the short run, they may benefit in the long run from increased supplies generated by the high prices. The choice of policy instruments to achieve food self-sufficiency must be made over a particular time horizon and in the context of equity objectives for consumers.

Food aid, another instrument of food policy objectives, is similar to trade in that it supplements the domestic supply of food. On the other hand, it does not compete for foreign exchange to the same extent. Implications of food aid for government finance and production incentives may be quite complex, depending on how it is incorporated into the food system. While either commercial or concessional imports may reduce the incentive for domestic food production—and here incentives are relevant to agriculture ministry officials as well as farmers—commercial imports tend to necessitate the production of exportable goods, whereas food aid has been criticized because it may dampen production incentives without this other "positive" effect.

Whether food aid reduces prices and depresses incentives depends on how it is used (44). If food aid creates food demand as well as augments food supply, then there may be little or no price-depressing effect. To create demand, the food must be distributed to groups not previously using that particular food; otherwise, the aid would simply replace previous purchases. Food for work programs and some targeted ration schemes may have this demand-creating effect. Even if food aid is used in a way that avoids disincentives to production in the short run, its longrun use may generate a considerable debt which, even with a generous grace period, may require debt restructuring or forgiveness.

The most general type of tradeoff facing food policymakers is whether to intervene in the economy or to allow markets to function freely. Political pressure and other factors may bias governments toward intervention, or at least toward a quick and visible public sector response to a slower free market adjustment. If markets for goods or services function well, then resources are allocated efficiently by the price mechanism, and it is difficult, usually impossible, for the public sector to outdo the private sector. On the other hand, if a government wishes to redistribute income (food purchasing power), then intervention may be necessary.

Another common argument for intervention is that markets are not functioning well, meaning therefore that a good or service is not valued correctly. For example, the high price of food in the city is frequently ascribed by governments to hoarding or excessive marketing profits. If there is indeed a difference between the market price and the social value of a good, there may be a genuine case for government action. In taking action, however, the government should, from an economic standpoint, seek to remedy the cause of the market imperfection as directly as possible. Thus, if poor transportation facilities keep the price of food up, the government should build roads rather than take over grain marketing, which merely shifts the problem from the private to the public sector.

The disadvantages of government intervention in the food economy are discussed in a recent World Bank report (53). The following points are made:

- Any resources used by government are diverted from other possible uses.
- Taxation may be detrimental. That is, a tax that is easy to administer, like a tax on agricultural exports, may create a production disincentive.
- Government services are often inefficient. Grain marketing is a relevant example in many cases.
- Protection of industries leads to high costs for consumers as well as expensive inputs for farmers and other industries.
- The fiscal burden of price-setting has often led to incentive prices set too low to achieve their intended goals.

Another danger of intervention in the long run is that it usually is a difficult process to reverse: governments have tended to intervene more over time, rather than less. This puts an increasing burden on those administering government programs and on those sectors of the economy providing resources to the government.

Factors Promoting Successful Food Policies

In addition to the conflicts, constraints, and tradeoffs with which policymakers must contend, there are some factors which tend to promote the success of food policy.

The first is the rate of economic growth. A government seeking a redistribution of income, which is what many policies amount to, will have a much better chance if total

income is growing, as Timmer (46) has noted. Otherwise, the policy problem is a zero-sum game: what one group gains must come from another group's losses. A growing "pie," on the other hand, gives the government more maneuverability.

A country growing more than one staple food crop has more policy flexibility than a country depending upon only one staple. In such a one food crop economy, policymakers must manipulate the price or quantity of just that one crop. High prices will hurt poor consumers disproportionately, and low prices will benefit better off consumers whether or not this benefit is intended. Production or import shortfalls will be particularly serious. A buffer stock, if held, would have to be larger and costlier than otherwise to yield a reasonable amount of nutritional protection.

But, if there are a number of acceptable or somewhat substitutable staple foods, then the possibilities for food policies are more numerous. Where there is an inferior and a superior staple, the policymaker may subsidize the consumption of the poor people's food and support the price of the superior food, unless all staples are perfect substitutes. In this way, poor consumers and producers receive assistance, and benefits tend not to flow to richer consumers. If the price support benefits richer producers too much, an acreage or other limitation can be added. On the other hand, if one staple is produced domestically and one is imported, the degree of policy flexibility is likely to be reduced.

Survey of Policy Objectives and Instruments

This section presents information on specific policy instruments for 21 African, Asian, and Latin American countries in the context of each government's stated policy objectives.[10] We focus on the period following the 1973-1974 food crisis through the early eighties because of the policy measures many countries instituted in response to that crisis. We also highlight recent changes and examine the major policies of each country to gauge the structure and extent of government intervention in the food and

agricultural sector and the possible influence of policies on the production, consumption, and trade of agricultural commodities.

We emphasize policies designed to affect food grains and other major staples, although policies directed toward agricultural export crops are discussed where appropriate. The primary policy instruments of interest are official producer and retail price controls, food subsidies, international trade restrictions, and credit and input subsidies. We also include some information about the constraints under which a policymaker must operate.

We assume there is a relationship between policies and performance in the food sector. However, it is beyond the scope of this survey to establish a direct, causal link between a particular instrument and the achievement of a specific objective. Rather, we examine policy instruments to assess their appropriateness and potential for achieving a stated objective. We generally attempt to answer two questions: Have policies been implemented in a manner consistent with stated objectives? Which objective, stated or unstated, has received priority?

Food policy objectives of the countries surveyed are listed in table 1. The classification is based on the earlier description of various developing country objectives, with increased food production omitted. "Food security" here refers to the earlier objective of adequate and stable food consumption. Objectives listed are based on official pronouncements of governments and therefore represent stated objectives.

Food Policy Objectives: Summary

Each African country cites self-sufficiency as a policy objective, although the goal is usually stated in terms of only grains and basic staples. The other objective most often cited is improving producer income (six countries). The two objectives are logically compatible. One way to achieve self-sufficiency is through greater food production, and increases in production can be encouraged by measures which will also improve farmers' incomes. In addition, several countries cite expanding agricultural exports as a means of easing the burden of large food import bills. Most African countries place emphasis, at least verbally, on equalizing distribution of income between rural and urban areas and achieving social and economic equity for the population.

All six Asian countries cite increased producer welfare and income as a primary agricultural goal. Bangladesh, India, Indonesia, Philippines, and Sri Lanka have an explicit food

[10]The information presented in this section was derived largely from the World Bank, International Monetary Fund, the U.S. Department of Agriculture, and the Food and Agriculture Organization of the United Nations and was supplemented by a survey of country analysts in the International Economics Division of USDA's Economic Research Service.

self-sufficiency objective. There is a greater emphasis on consumer welfare and stable prices than in Africa. Thailand, the only traditional grain exporter, states earning foreign exchange and government revenue as agricultural policy goals. In 1981, Thailand also included producer welfare as a policy objective. Bangladesh, Philippines, Sri Lanka, and Indonesia have specific nutrition and consumption goals as part of a food security objective.

The Latin American countries have less explicit emphasis on food self-sufficiency. Haiti, Brazil, and Guatemala are the only countries citing food self-sufficiency as an objective. Brazil, Dominican Republic, Guatemala, and Paraguay cite enhancing consumer welfare and foreign exchange earnings as primary objectives. Each country except Brazil and the Dominican Republic expresses improving farmer income as an objective, although Brazil is concerned with eliminating regional inequities in the distribution of income.

Brazil is the only country with an explicitly stated national nutrition plan.

Producer welfare and food self-sufficiency are objectives cited most often in table 1. Most countries view these two objectives as different sides of the same coin. The food security objective is predominantly an Asian phenomenon. Objectives of consumer welfare and stable prices occur in tandem in many countries and are found almost exclusively in Asian and Latin American countries.

Instruments and Controls: Summary

Figure 2 summarizes the direct production, marketing, and trade controls governments have instituted to achieve their stated objectives. This information allows one to draw general conclusions about the structure of direct government intervention in the food and agricultural sector. The

Table 1—Government food policy objectives for 21 developing countries

Region/country	Consumer welfare	Producer welfare	Government revenue	Foreign exchange	Self-sufficiency	Stable prices	Food security
	X indicates presence of objectives						
Africa:							
Botswana		X			X		X
Kenya		X		X	X		X
Mali		X			X	X	
Morocco					X		
Nigeria		X			X		
Senegal		X			X		
Sudan		X		X	X		
Tanzania					X		
Asia:							
Bangladesh	X	X		X	X	X	X
India	X	X			X	X	X
Indonesia	X	X			X	X	X
Philippines		X			X	X	X
Sri Lanka	X	X			X	X	
Thailand	X	X	X	X		X	
Latin America:							
Brazil	X			X	X		
Dominican Republic	X			X	X		
Guatemala	X	X	X	X	X	X	
Haiti		X				X	
Jamaica		X					
Paraguay		X		X			
Peru	X	X					X

Sources: Country analysts in IED/ERS; selected country documents.

Figure 2

Structure of Direct Government Intervention for Major Grains and Staples

Region/Country	Production and Marketing Controls[1]						Trade Controls[2]					
	Wheat	Rice	Corn	Sorghum	Millet	Other	Wheat	Rice	Corn	Sorghum	Millet	Other
Africa												
Botswana	⊗	○	◐	◐	○	○	○	○	◔	◔	○	◔ [3]
Kenya	◑	●	◑	◑	◑	◑ [4]	◑	◔	◐	○	○	○
Mali	⊗	●	◑	◑	◑	● [5]	◐	◐	◐	◐	◐	○
Morocco	●	○	◑	◑	○	◑ [6]	◑	◔	◔	○	○	○
Nigeria	⊗	◑	◑	◑	◑	○	◑	◑	◑	○	○	◑ [7]
Senegal	◑	◔	○	⊗	◑	● [5]	◔	◔	○	○	○	○
Sudan	◑	⊗	○	○	○	○	◔	○	○	○	○	○
Tanzania	●	●	●	◑	◑	● [4]	◐	◐	◐	◐	◐	◔ [4]
Asia												
Bangladesh	◔	◔	○	⊗	⊗	○	◐	◐	○	◔	○	○
India	◔	◑	◑	○	○	○	◕	◐	◐	◐	◔	◔ [8]
Indonesia	●	●	◑	⊗	⊗	○	◐	◐	◐	○	○	◔ [4]
Philippines	⊗	●	◑	◔	⊗	◔ [4]	◔	◐	◔	◔	○	◔ [8]
Sri Lanka	◔	●	○	⊗	○	○	◔	◔	○	○	○	○
Thailand	○	◔	○	○	⊗	○	○	◔	◔	◔	○	◔ [4]
Latin America												
Brazil	◔	◑	◔	○	⊗	◔ [4]	◔	◔	○	○	○	○
Dominican Rep.	⊗	●	◔	○	⊗	◔ [9]	◔	◔	◔	◔	◔	○
Guatemala	◔	◔	◔	◔	⊗	○	◑	◑	◑	◑	○	○
Haiti	⊗	○	○	⊗	⊗	○	◔	◔	○	○	○	◔ [10]
Jamaica	⊗	◔	○	⊗	⊗	○	◔	◔	◔	○	○	○
Paraguay	◔	○	○	⊗	⊗	○	◔	◔	◔	○	○	◔ [11]
Peru	○	○	◕	◕	○	● [12]	◔	◔	◔	◔	○	○

Black areas represent government controls.

[1] procurement / storage / processing / transportation   ⊗ not grown or negligible amount   [2] export monopoly / export tax or quota / import license / import monopoly

[3] Oilseeds and pulses.   [4] Cassava.   [5] Groundnuts   [6] Barley.   [7] Fruits, vegetables, pulses, livestock.   [8] Pulses.   [9] Beans and sweet potatoes.   [10] Oilseeds and sugar.   [11] Meat.   [12] Beans and potatoes.

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information reflects government intentions, not the actual implementation or effectiveness of the controls.

The African countries apply production, marketing, and trade controls on a wide range of major grains and other basic staples (fig. 2). Tanzania, Mali, and Kenya employ controls on the greatest number of crops and attempt to influence the production and consumption of most basic staples. Intervention by Morocco, Senegal, and Nigeria is less pervasive, but is still significant and focuses on wheat, rice, and corn. The Sudan focuses controls on the production and trade of wheat. Botswana intervenes directly only for its two major crops, corn and sorghum, and is the only country without a grain import monoply. All other countries control wheat, rice, and corn imports through government monopoly or licensing arrangements. Botswana, Kenya, Mali, and Tanzania also have government monopolies for grain exports.

Asian governments intervene most often in the production, marketing, and trade of rice and wheat, the major food grains consumed in the region. Controls on other grains are less prevalent, although India maintains controls on all the major grains and pulses. The Philippines maintains controls on more items than do Sri Lanka, Bangladesh, and Thailand. Export controls are more prevalent than in Africa or Latin America, particularly for Thailand, a traditional grain exporter. Export controls are also important in India, an occasional exporter of grain.

Production and marketing controls are less widespread in the Latin American countries, although there is great diversity among countries. Brazil, Dominican Republic, Guatemala, and Peru have intervened more extensively than the other three countries. All seven countries regulate imports of wheat and rice through a government monopoly or licenses and five countries also regulate corn imports. Export controls are not significant.

There is a broad spectrum of government intervention among the three regions, ranging from Tanzania, which attempts to control almost all aspects of the food and agricultural sector, to Paraguay, which has an explicit policy of minimal government involvement. The African and Asian countries rely more heavily on direct production, marketing, and trade controls than do the Latin American countries. Wheat and rice are the primary commodities regulated in Asia and Latin American, whereas controls in Africa often extend to other commodities: corn, sorghum, millet, cassava, and groundnuts.

Table 2 data indicate the extent of government intervention in each country. Basic commodities under direct government price controls, whether grown domestically or imported, are presented as a share of daily per capita caloric consumption. The data do not provide a precise measure of the extent of government intervention, but do show the relative importance in the diet of commodities whose prices are under direct government control. Although the African countries tend to have controls on a greater number of commodities than the other two regions, the predominance of rice in the diet of Asian countries results in greater government intervention, on average, in Asia than the other regions. Examples are Bangladesh where two commodities, wheat and rice, account for 85 percent of consumption, and Tanzania where six commodities account for about 60 percent of consumption.

Government controls in most countries tend to operate with different degrees of effectiveness in urban and rural areas for different commodities. For example, corn is the basic staple in Kenya and accounts for 45 percent of daily per capita consumption. However, retail price controls are probably less effective on corn consumed in the rural areas than controls on wheat and rice—accounting for only 5 and 1 percent of consumption, respectively—consumed primarily in the urban areas. In addition, a wide variety of other food items are under direct price controls in most countries: sugar, vegetable oils, meats, and dairy products.

The greater the importance of an item in total production and consumption, the more likely are marketing and production controls. Food imports important to the diet in urban areas—those of wheat and rice—are regulated more often by direct price controls than other grains.

Regional Assessments

The following section examines some specific policies employed by country governments, including production and marketing controls, trade controls and exchange rates, and credit and input subsidies. We conclude each regional discussion by exploring constraints to implementing policies and identifying which objectives have received priority in the pursuit of specific policies.

Africa

Production and marketing controls. Most of the eight African countries surveyed are poor and have primarily agricultural economies (table 3). Nigeria is the major exception, with much of its economic activity centered on

petroleum. Economic growth was rapid during the seventies in Botswana and Nigeria. The remaining countries had fair to good economic growth rates. Agricultural growth rates were less impressive. Of the countries considered in this study, only Botswana, Kenya, and Tanzania reached a level of per capita food production in 1980 greater than the 1969-71 average level. Per capita food production in the other five countries was considerably below the level of the early seventies.

Agriculture is the dominant sector in the African countries, contributing from less than 15 percent to 50 percent of GDP. Agriculture's share of export earnings is more diverse, ranging from only 8 percent in Nigeria to over 90 percent in Mali, Sudan, and Tanzania. The agricultural sector is the primary employer in each country, constituting 50 to 75 percent of the labor force.

Tanzania intervenes extensively in the production and marketing of all basic food staples. Producer incentives were restructured after 1974 to favor food crops, with an emphasis on traditional, drought-resistant crops and corn. Pricing and procurement policies were redirected toward

Table 2—Share of consumption of major grains and staples under direct price controls, 1980

Region/country	Percentage of consumption						
	Wheat	Rice	Corn	Sorghum	Millet	Other[1]	Total
	Percent						
Africa:							
Botswana	—	—	27	—	20	—	47
Kenya	5	1	45	4	3	6	64
Mali	2	11	6	—	54	—	73
Morocco	[2]63	—	3	—	—	—	66
Nigeria	3	3	6	13	17	—	42
Senegal	10	24	—	—	24	5	63
Sudan	9	—	—	35	—	—	44
Tanzania	3	4	25	25	2	2	61
Asia:							
Bangladesh	12	73	—	—	—	—	85
India	18	31	3	—	—	—	54
Indonesia	4	52	7	—	—	—	63
Philippines	5	40	13	—	—	—	58
Sri Lanka	18	42	—	—	—	—	60
Thailand	—	[3]68	—	—	—	—	68
Latin America:							
Brazil	12	—	—	—	—	—	12
Dominican Republic	11	20	4	—	3	9	47
Guatemala	7	2	47	—	—	—	56
Haiti	7	—	—	—	—	—	7
Jamaica	22	8	—	—	—	—	30
Paraguay	6	—	—	—	—	—	6
Peru	18	11	10	—	—	7	46

Note: Data in table 2 are the latest available, but may not be fully up to date because of recent shifts in government policies. The data reflect the situation in the late seventies and early eighties.

— = Not applicable.

[1]Roots, tubers, and pulses.
[2]Includes 21 percent of barley.
[3]Prices indirectly influenced by Government stock and export policies.

Source: (*17*).

Table 3—Basic economic indicators of selected African countries

Country	Per capita GNP, 1980	GNP annual growth rate, 1970-80	Agriculture annual growth rate, 1970-1980	Agriculture's share of GDP, 1980	Agricultural share of exports, 1978	Agricultural labor force, 1980	Per capita food production, 1980
	U.S. dollars			―Percent―			1969-71 = 100
Botswana	910	[1]11.8	NA	16	[2]15	[3]81	[4]107
Kenya	420	6.5	5.4	34	67	78	99
Mali	190	4.9	4.4	42	99	73	71
Morocco	900	5.6	.8	18	36	52	87
Nigeria	1,010	6.5	.8	20	8	54	86
Senegal	450	2.5	3.7	29	80	76	65
Sudan	410	4.4	2.6	38	95	72	84
Tanzania	280	4.9	4.9	54	90	83	96

NA = Not available.
[1]1972-1979.
[2]Average for 1978-80.
[3]Only 6 percent of the labor is formally in agriculture.
[4]Food and Agriculture Organization of the United Nations index.

Sources: (16, 51, 52, 53, 55).

basic staples. In the midseventies, the producer price for corn, the basic staple, was raised at a faster rate than the other grains and was one of the few items to keep up with inflation (table 4). Food crop prices, compared to both domestic inflation and world prices, were generally higher than export crop prices. Low producer prices and export taxes discouraged coffee and tea production and contributed to black market activity in some commodities. Between 1970-73, exports contributed 24 percent of GNP, but only 12 percent in 1981.

Cereal imports have fluctuated in response to production shortfalls and in some years have been large relative to marketed cereal consumption (tables 5 and 6).

Official producer prices lagged behind the rate of inflation in the late seventies except for corn. There has been a general shift away from marketed production of major cereal and export crops towards subsistence crop production, reflecting both government policy and drought in 1977 and 1980. Between 1973-79, the subsistence sector increased at an average rate of 8.6 percent, while the commercial sector grew at an average rate of only 2.8 percent. Government procurement as a share of production is substantial for wheat, but less than 25 percent of production for corn, rice, and sorghum (table 7). During the seventies, the volume of production marketed declined for wheat,

rice, and cotton, but increased for corn, millet, sorghum, and cassava. Until July 1981, food items were bought nationally for a single price, encouraging production in remote areas ill-suited for production.

Tanzania controls prices on almost all retail food items and has subsidized the price of many basic staple products. Maize and maize flour, staples for low-income people, are the most heavily subsidized items. Prices also are set for traditional food items: sorghum, millet, and cassava. Lack of storage and transportation facilities have limited the effectiveness of direct price intervention. The Government has considered lowering prices of traditional foods to encourage consumption since imports of wheat, rice, and corn have been increasing to meet the growing demand.

Results from the Tanzania case study reported in the next section suggest that the Government decision to raise the price of corn relative to other crops is, in part, a reaction to the large welfare costs that are incurred for a major staple when the domestic price diverges from the world price. The retail price was also doubled in July 1981.

The Government of Mali began liberalizing many controls over the production and trade of food grains in 1981. Prior to the 1981/82 crop year, the Government was heavily involved in the food sector. Producer prices for food and export crops were controlled. Grain prices were set low

Table 4—Changes in world prices, CPI, and official producer prices for selected countries and commodities

Country/commodity	Percentage change over previous year						
	1975	1976	1977	1978	1979	1980	1981
	Percent						
World price:[1]							
Wheat	−13	−15	−22	16	26	15	4
Rice	−32	−32	7	29	−4	27	13
Corn	−7	−9	−14	2	23	14	3
Sorghum	−12	−6	−16	9	22	26	−3
Africa:							
Kenya—[2]							
CPI	19	11	15	17	8	14	14
Corn	52	10	16	0	−19	86	5
Rice (paddy)	76	32	−1	7	4	NA	NA
Wheat	31	14	11	0	8	NA	NA
Mali—							
CPI	23	9	16	18	21	NA	NA
Millet/sorghum	60	0	0	13	11	25	40
Rice	60	0	0	13	11	20	25
Corn	60	0	0	13	11	25	40
Morocco—							
CPI	8	9	13	10	8	9	14
Hard wheat	NA	0	35	0	24	0	NA
Soft wheat	NA	0	42	0	24	0	NA
Barley	NA	0	63	0	23	0	NA
Corn	NA	0	44	0	23	0	NA
Senegal—							
CPI	32	1	11	4	10	9	6
Millet/sorghum	NA	0	17	0	14	0	0
Rice	NA	1	0	0	0	0	0
Corn	NA	0	0	43	25	0	0
Tanzania—							
CPI	26	7	12	11	11	30	NA
Corn	52	50	0	6	0	18	0
Rice (paddy)	14	54	0	20	0	25	17
Wheat	35	30	20	4	0	8	22
Millet (finger)	NA	46	12	111	0	0	−25
Asia:							
Bangladesh—[3]							
CPI	24	−10	10	13	13	13	13
Rice (paddy)	65	0	0	9	0	23	8
Wheat	NA	NA	NA	9	4	29	10
India—[4]							
CPI	6	−8	9	3	6	12	13
Rice (paddy)	NA	NA	0	4	10	12	10
Wheat	NA	NA	0	5	2	4	0
Indonesia—[4]							
CPI	19	20	11	8	22	19	12
Rice (paddy)	NA	11	2	9	32	11	19
Rice (milled)	NA	17	4	6	27	11	11
Sri Lanka—							
CPI	7	1	1	12	11	26	18
Rice (paddy)	10	0	0	21	0	NA	NA
Corn	−15	−27	2	13	5	NA	NA
Sorghum	4	−40	18	−44	NA	NA	NA

See footnotes at end of table.

Continued—

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Table 4—Changes in world prices, CPI, and official producer
prices for selected countries and commodities—Continued

Country/commodity	Percentage change over previous year						
	1975	1976	1977	1978	1979	1980	1981
	Percent						
Latin America:							
Brazil—[5]							
CPI	29	42	44	39	53	83	105
Rice	54	25	41	40	53	76	106
Wheat	87	19	70	12	31	NA	NA
Beans	30	25	76	29	34	66	129
Corn	22	34	34	24	42	89	146
Sorghum	NA	NA	NA	NA	39	72	170
Guatemala—[5]							
CPI	13	11	13	8	12	11	11
Rice	NA	NA	−18	16	38	0	17
Wheat	NA	NA	0	0	0	0	0
Beans	NA	NA	−37	13	29	0	16
Corn	NA	NA	−26	12	18	0	16
Sorghum	NA	NA	−1	5	10	0	3

NA = Not available.
[1]Average change in prices for major exporters.
[2]Average price paid by marketing boards.
[3]Procurement prices.
[4]Support prices.
[5]Minimum support prices.

Sources: Selected country documents from the International Monetary Fund and World Bank.

relative to world and regional prices and did not keep up with inflation (table 4). The Government marketing board (OPAM) purchased less than 10 percent of cereal production (table 7) and extensive parallel markets existed for cereals. The Government encouraged rice over millet and sorghum production, and the producer price for rice increased faster than the official retail price.

Production and marketing of groundnuts also declined during the seventies, partly as a result of low producer prices and substantial export taxes. Cotton producers fared much better. Although producer prices were low relative to other countries and taxes are high, cotton producers were organized into producer groups and received substantial Government services, such as credit and fertilizer. Over 90 percent of cotton production is marketed through the official board.

Mali controlled retail pricing and marketing of major staples. Official retail prices for rice and millet increased at a slower rate than the CPI (table 8). The retail price for rice increased at a slower rate than that for millet, and rice prices were below comparable world prices. Despite the official price controls, parallel markets were widespread and prices were often three times as high as official prices. Cereal imports fluctuated depending on production levels and reached very high levels in 1973 (tables 5 and 6). As of the 1981/82 crop year, the Government announced a liberalized marketing system for millet, sorghum, and corn (but not rice), resulting in a much more limited role for OPAM. Private (licensed) traders are now allowed to buy and sell coarse grains. Floor and ceiling prices are set, and OPAM, in theory at least, intervenes when producer prices fall below the floor price and retail prices rise above the ceiling price.

Kenya has focused producer price supports more on food than export crops, although marketing boards exist for both. Producer prices for wheat, corn, and rice have been set close to import parity levels since 1976. In the early and midseventies, producer prices generally kept pace with inflation, but have recently lagged behind (table 4). The

Government markets almost all of the wheat, rice, sugar, coffee, and tea, but only about 15 percent of corn production, the basic staple (table 7). The marketing board has transported corn within the country to help stabilize supplies and prices and has restricted private traders from transporting corn between regions. Parallel markets for corn operate in the rural areas as a result. Storage capacity has been inadequate to fulfill Government objectives. After large corn harvests in 1977 and 1978, storage facilities were inadequate and the producer price was lowered for the 1979 season.

Kenya controls the retail price for basic staples. Food prices have risen more slowly than the CPI, and official prices for milk, bread, rice, and beef have been set below import parity levels (table 8). The Government purchase price for corn rose faster than the retail price. Although Kenya has traditionally been a net cereal exporter, cereal imports have been increasing. Cereal imports equalled 10 percent of consumption in 1980 (tables 5 and 6).

Results from the case study of Kenya show that intervention has altered the price structure of food grains produced for domestic consumption and export crops from what this price structure would have been under free trade. Even though Kenya and Tanzania have similar food policy objectives and employ virtually the same policy instruments to attain their objectives, the case studies show that prices are less distorted in Kenya than in Tanzania.

Table 5—Cereal imports as a percentage of total imports[1]

Country	Average 1969-71	1972	1973	1974	1975	1976	1977	1978	1979	1980
					Percent					
Africa:										
Botswana	7	6	6	2	4	2	3	2	3	2
Kenya	1	1	2	*	1	*	*	1	*	4
Mali	4	10	23	29	19	4	3	6	4	4
Morocco	5	5	11	10	11	7	5	8	8	8
Nigeria	4	3	3	3	2	2	4	4	3	3
Senegal	14	10	19	19	9	12	10	10	8	NA
Sudan	4	5	6	4	2	4	2	2	5	5
Tanzania	2	3	1	14	14	2	5	3	2	8
Asia:										
Bangladesh	NA	29	43	35	35	29	7	17	7	25
India	15	4	16	16	24	24	3	2	1	*
Indonesia	19	13	17	12	8	9	12	10	10	8
Philippines	4	7	6	4	4	4	2	2	2	2
Sri Lanka	23	17	29	35	42	30	32	20	13	9
Thailand	*	*	*	*	*	*	*	*	*	*
Latin America:										
Brazil	5	3	6	4	3	4	2	5	6	6
Dominican Republic	3	2	4	9	8	9	5	4	3	4
Guatemala	2	2	3	3	4	2	2	2	2	3
Haiti	9	6	13	15	13	13	18	10	18	16
Jamaica	13	5	7	8	7	9	6	8	5	9
Paraguay	5	5	3	6	2	4	2	1	2	2
Peru	8	8	11	10	11	8	8	7	10	11

NA = Not available.
* = Less than 1 percent.
[1]Includes food aid in cereal imports.

Sources: International Monetary Fund and Food and Agriculture Organization of the United Nations.

Senegal's Government intervenes in the production and marketing of various food and export crops. Producer prices in Senegal have been below world prices and have not kept up with inflation (table 4). Corn and millet prices have been much higher relative to world prices than rice, and rice prices were not raised between 1977 and 1981. Producer prices for all major crops were raised for the 1981/82 season.

Cereal production fluctuated greatly during the seventies with corn and millet faring slightly better than rice. Official marketings of cereals have been only 2-3 percent of production. Groundnut production has been even more disappointing. The absolute volume of marketed production and

exports of groundnuts has declined drastically in recent years with poor weather a factor in the performance.

The Government sets prices of most basic consumer items. Many prices were set below costs of production or import prices and entailed subsidies from the price stabilization fund. During the early seventies, the marketing board incurred losses on rice, wheat, millet, and corn, but made a profit on its groundnut operations. The major loss now comes from rice subsidies. The official retail price for rice was unchanged between 1976-81, but was raised 31 percent in early 1982 (table 8). The subsidies have encouraged cereal imports, currently providing almost 50 percent of cereal consumption (tables 5 and 6).

Table 6—Net cereal imports as a percentage of cereal consumption[1]

Country	Average 1969-71	1972	1973	1974	1975	1976	1977	1978	1979	1980
					Percent					
Africa:										
Botswana	57	48	85	47	42	6	17	17	91	18
Kenya	(—)*	−8	−4	3	−8	−2	2	(—)*	3	10
Mali	1	3	12	6	3	*	2	*	2	2
Morocco	8	11	25	20	26	18	35	25	30	30
Nigeria	4	5	5	4	6	10	15	18	16	17
Senegal	32	49	40	20	32	39	48	34	44	47
Sudan	6	4	8	2	−5	8	2	8	6	8
Tanzania	4	5	14	36	17	6	10	−2	7	22
Asia:										
Bangladesh	7	22	12	16	10	6	14	8	17	7
India	3	1	4	6	8	6	(—)*	1	−1	(—)*
Indonesia	6	7	12	8	7	11	14	13	13	14
Philippines	14	16	14	13	10	13	11	9	8	8
Sri Lanka	50	46	51	51	59	58	59	36	41	36
Thailand	−43	−24	−39	−35	−49	−56	−29	−50	−49	−49
Latin America:										
Brazil	4	13	5	4	8	4	19	20	18	18
Dominican Republic	41	36	54	51	52	52	58	43	52	61
Guatemala	11	10	15	14	12	11	23	13	15	15
Haiti	6	14	16	19	31	36	23	19	22	28
Jamaica	98	99	99	100	97	99	98	96	97	95
Paraguay	14	9	16	4	9	16	18	14	14	21
Peru	36	45	43	45	50	45	42	40	50	63

Note: Negative value means exports.
* = Less than 1 percent.
[1]Includes feed use.

Source: IED/ERS.

The financial position of Government parastatals (government agencies performing private sector functions) has recently forced the Government to modify its policies. Some food items have been decontrolled, and retail prices on bread, sugar, and groundnut oil have been increased. The marketing agency has been abolished and marketing of food grains is now done by private traders. An analysis of Senegalese food policy with a focus on rice appears in the next section.

Public corporations in the Sudan control large sectors of production for certain food and export crops, including almost all wheat, sugar, cotton, and some sorghum, sesame, and groundnuts. Wheat and sugar producer prices have been higher relative to world prices than other crops. Wheat has been the primary food crop under Government control. Wheat area and production began expanding in the midseventies at the expense of cotton as Government

Table 7—Share of production procured by official marketing boards for selected countries and commodities

Country/commodity	1975	1976	1977	1978	1979	1980
	Percent					
Africa:						
Kenya—						
Corn	26	26	19	13	18	15
Mali—						
Cereals	10	8	6	7	10	7
Morocco—						
Soft wheat	58	13	14	3	32	NA
Hard wheat	6	2	7	4	9	10
Barley	3	1	4	1	4	3
Corn	7	5	29	6	18	17
Tanzania—						
Corn	3	10	13	21	25	13
Rice[1]	15	7	6	10	14	NA
Wheat	26	42	77	92	92	NA
Sorghum	1	1	4	13	25	NA
Asia:						
Bangladesh—						
Wheat, rice	0	2	2	3	2	2
India—						
Food grains	[2]11	12	10	10	12	12
Indonesia—						
Rice	4	3	3	2	5	2
Sri Lanka—						
Rice	22	22	31	37	29	15
Latin America:						
Brazil—						
Rice[1]	*	10	10	2	6	NA
Beans	2	0	*	3	*	NA
Corn	*	2	8	[3]12	[3]10	NA
Sorghum	*	6	18	3	*	NA

NA = Not available.
* = Less than 1 percent.
[1]Paddy.
[2]Procurement as a share of marketed production.
[3]Includes imports.

Sources: Selected country documents from International Monetary Fund and World Bank.

Table 8—Changes in CPI and official retail prices for selected countries and commodities

Country/commodity	Percentage change over previous year						
	1975	1976	1977	1978	1979	1980	1981
	Percent						
Africa:							
Mali—							
CPI	23	9	16	18	21	NA	NA
Millet	16	0	10	0	14	19	10
Rice (paddy)	32	0	0	22	10	20	−1
Corn	36	0	16	8	16	19	NA
Kenya—[1]							
CPI	19	11	15	17	8	14	12
Maize flour	20	25	0	0	0	NA	NA
White bread	17	0	7	7	6	NA	NA
Wheat flour	25	0	8	4	4	NA	NA
Rice	46	29	0	0	0	NA	NA
Morocco—							
CPI	8	9	13	10	8	9	14
Sugar	NA	0	0	0	16	33	21
Edible oil	NA	0	0	0	14	21	15
Butter	NA	NA	0	4	9	24	27
Wheat flour	NA	NA	NA	NA	NA	11	20
Nigeria—							
CPI	34	24	19	19	11	10	23
Wheat bread	5	0	0	55	NA	NA	NA
Senegal—							
CPI	32	1	11	4	10	9	6
Rice	NA	NA	0	0	0	0	0
Asia:							
Bangladesh—[2]							
CPI	24	−10	13	13	13	13	13
Rice	53	50	0	6	8	19	17
Wheat	NA	NA	NA	7	9	13	20
Sri Lanka—							
CPI	7	1	1	12	11	26	18
Rice	NA	NA	NA	0	62	17	NA
Wheat flour	NA	NA	NA	87	21	74	NA
Latin America:							
Brazil—							
CPI	28	42	44	39	53	83	105
Wheat[3]	−23	−9	11	−16	−24	NA	NA
Peru—							
CPI	24	34	38	58	67	59	75
Rice	0	63	40	41	103	19	90
Yellow corn	74	20	26	76	84	44	48
Sorghum	73	19	33	67	84	48	44
Wheat flour	28	53	66	129	−12	[4]	[4]

NA = Not available.
[1] Prices in Nairobi.
[2] Average issue price at ration shops.
[3] Government price to millers.
[4] Price supervised but not controlled.

Sources: Selected country documents from International Monetary Fund and World Bank and IMF's *International Financial Statistics,* various issues.

policies were biased against cotton producers. Cotton producers bore the input costs for all crops and faced delayed payments, export taxes, differential exchange rates, and lower profit margins. The decline in cotton production and exports has had a severe impact on the balance of payments and the financial position of the marketing boards. The Government is attempting to restructure incentives toward cotton production as wheat production has fared poorly.

There has been little direct Government intervention outside the publicly controlled areas. The Government sets minimum prices for some crops, but private traders procure and market commodities.

The Government, administering prices of many basic consumer items, tries to pass along some increased costs to consumers. The retail price for sorghum has increased 20 percent annually over the last 5 years. The Government has, however, subsidized the retail price of wheat: the producer price has been above the retail price. Farmers sell some wheat on parallel markets and official retail prices are not always observed. Sudan imports over half its wheat consumption, although total cereal imports have not been large relative to total imports or cereal consumption (tables 5 and 6). The Government, attempting to reduce the subsidy on wheat consumption, recently raised prices.

The Government maintains the retail price for sugar well above the producer and import price to earn revenue. However, the price at which the Government purchases the sugar from the Sugar Refining Corporation (SRC) has been too low to cover production costs; the SRC has had to borrow money to cover its deficit. As part of an economic recovery program to meet International Monetary Fund (IMF) conditions, Sudan has a standby agreement whose conditions include raising the price of sugar 62 percent, tea 43 percent, and vegetable oil 85 percent. In addition, Government monopolies over the import and distribution of wheat and sugar have been recently eliminated.

Nigeria sets minimum procurement prices for the major staples. But these prices have been below domestic market prices; procurement by the various commodity boards has been low. Little grain has been procured for a planned strategic reserve. Support prices for food crops generally have not provided an incentive for production, although support prices for basic grains were raised substantially in 1980. Growth in production and yields for most crops was slow or stagnant during the seventies.

Producer prices for export crops have been adjusted more frequently than for food crops, but the performance has been worse than that of the food crop sector. Yields have been declining, as have marketing board purchases for cocoa, groundnuts, and cotton. Poor marketing and transportation have encouraged some producers to return to subsistence and away from cash crop production. Profitability of the agricultural sector has declined relative to the burgeoning services and construction sectors in the wake of the oil boom.

Food crop marketing is unrestricted and generally takes place in small, local markets. Little competition among marketers has resulted in wide price fluctuations in rural marketing channels. Higher incomes and Government policies have encouraged cereal imports. Real bread prices have fallen as Government-fixed prices have risen less than inflation (table 8). Cereal imports increased 850 percent between 1971 and 1977 and account for a growing share of consumption (tables 5 and 6). Sugar and dairy imports have also increased sharply.

Trade controls on cereals—licensing requirements, health regulations, and total bans—have been linked to urban food prices. The Government has been willing to use trade restrictions to counter both inflation and short-term foreign exchange shortages. These restrictions sometimes have resulted in shortages and high prices, and the Government has had to modify its policies in response to pressure from urban consumers.

Morocco maintains producer support prices for cereals, oilseeds, sugar, and several export crops. The support prices for cereals have been maintained at levels above world prices, but free market prices have been even higher as poor weather has seriously affected production and availability. The Government has raised producer prices substantially every other year (table 4). Official Government procurement of durum wheat, barley, and corn is small relative to production: less than 10 percent of durum, less than 5 percent of barley, and less than 20 percent of corn production. These levels reflect transportation and marketing problems as well as higher free market prices. Procurement and marketing of soft wheat and corn have been more variable than for durum wheat and barley.

Export crops, such as fruits and vegetables, and import substitution crops, such as sugar, have fared much better

than cereals. Until just recently, agricultural policy emphasized irrigation projects; fruit, vegetable, and sugar producers were the primary beneficiaries. The Government has a monopoly over the procurement and export of fruits and vegetables.

The Government controls the retail price of basic food items and subsidizes the price of butter, milk, sugar, edible oil, meat, and wheat products. Food prices have been increased at a lower rate than the CPI, reflecting Government subsidies (table 8). Retail prices for major food items have also increased at a slower rate than producer prices. Sugar and edible oils have received the highest subsidies, averaging about 50 percent of the retail price for 1979 and 1980. The Government has been trying to reduce the subsidies. Retail prices of subsidized commodities were raised in 1980 and 1981 although some price increases were reduced in 1981 in the wake of consumer protests. The combination of declining cereal production and subsidized prices has encouraged cereal imports. Cereal imports have been increasing as a share of total imports and consumption (tables 5 and 6).

Botswana created an agricultural marketing board (BAMB) in 1974 to provide a domestic outlet for surplus grain production and to discourage sales of surplus grain to South Africa. Prices in Botswana are strongly influenced by developments in South Africa. The support price for the basic grains—sorghum and corn—is essentially the South African price with some markup for transportation costs. Producer prices for the main cash crops—pulses and oilseeds—are maintained slightly below South African prices to encourage grain production. Producer prices for grains and cash crops have kept abreast of other cost-of-living increases and have contributed to real growth in average farm income.

BAMB's high procurement prices have resulted in larger Government purchases, reaching 35 percent of domestic production in 1978/79. But, BAMB does not have an official monopoly and the size of purchases varies considerably with weather conditions. By buying grain at different prices in surplus and deficit regions, BAMB has helped to stabilize prices. BAMB sells grain at retail prices below the procurement and the import price and thus requires a subsidy to cover the difference. In addition, private traders import grain below BAMB's price, and BAMB has been forced to accumulate stocks.

Grain production is highly variable, and grain imports are needed to meet demand. Although grain imports are small relative to total imports, grain imports often represent a large share of consumption, particularly in poor crop years like 1978/79 (tables 5 and 6).

Trade controls and exchange rates. Tanzanian Government agencies have monopoly rights for all food imports and exports. The composition and level of food imports in Tanzania are controlled through foreign exchange allocations. Prior to 1981/82, Mali's OPAM had a monopoly over all food imports. Private traders may now, however, legally import food in Mali. Kenyan imports of most cereals and other basic foodstuffs are a monopoly of the Government marketing board. Exports of corn and some other items are also a monopoly function of the board. Food imports in Nigeria are handled by either a Government monopoly or licensed private traders. Nigeria has also regulated trade through quantitative restrictions, health and safety regulations, and total prohibitions. Imports of fruits, vegetables, pulses, and livestock have been banned or highly restricted to encourage production. Exports of many food items are also prohibited.

Nigeria has a 40-percent duty on wheat flour, but no duty on unmilled wheat to promote the domestic processing industry. Senegal, Sudan, and Morocco have focused trade controls more directly on cereal imports, particularly wheat and rice. Senegal exempts essential foodstuffs from import duties and Sudan has differential exchange rates for imports of wheat, milk, and sugar. Morocco exempts food imports from the advance import deposit required for all other imports. Botswana is the only country which allows private traders to import cereals, although cereal exports are regulated. Botswana also has a monopoly for exports of pulses and oilseeds.

In addition to direct trade controls, indirect price intervention occurs through relative movements in exchange and inflation rates. Most African countries have allowed their exchange and inflation rates to appreciate relative to domestic and world inflation rates (table 9).[11] The overvalued exchange rates exacerbate the need to maintain restrictions on cereal imports.

Nigeria has had the highest inflation rate and has resorted to various trade restrictions to counter inflation and foreign exchange shortages. The system of overvalued exchange rates and import restrictions operates to varying degrees in

[11]The exchange rate is said to have appreciated if a country's inflation rate is greater than world inflation, unless it devalues by more than the difference in the inflation rates.

most African countries, except Botswana and Mali. Mali has an undervalued exchange rate relative to neighboring countries. Its rate is set at 50 percent below other countries in the *Communaute Financiere Africaine* (CFA) franc zone. The undervalued rate has encouraged illegal exports of cereals to neighboring countries, despite restrictions on the import and export of cereals.

Most African countries rely heavily on import duties and export taxes for government revenues (table 10). Export taxes have not been as significant as import duties for revenue, but most major agricultural exports have been taxed to varying degrees to earn revenue. Revenue from export taxes has fluctuated or declined in Mali, Senegal, Tanzania, and Sudan, reflecting poor export performance. To counter this decline in exports, Tanzania, Sudan, and Senegal have lowered or eliminated some export taxes. In addition, Senegal has instituted direct groundnut subsidies to encourage exports.

Table 9—Relative movement in exchange rates[1]

Country	1975	1976	1977	1978	1979	1980	1981
				Percent			
Africa:							
Botswana	−16.1	4.2	5.2	−5.0	6.2	11.8	16.2
Kenya	−2.6	3.1	6.5	9.7	−1.2	1.9	−21.9
Mali	16.0	.3	8.2	15.7	14.6	NA	NA
Morocco	6.9	−6.2	3.3	6.2	−1.9	−14.7	−8.1
Nigeria	25.4	16.1	3.5	5.3	16.1	4.8	19.4
Senegal	24.2	−17.2	3.9	−6.1	3.2	−11.9	−20.3
Sudan	17.4	−5.8	3.9	−6.1	.7	16.8	71.6
Tanzania	−4.8	−1.4	3.1	4.2	−7.5	21.9	19.1
Asia:							
Bangladesh	−62.3	−18.0	−1.2	−6.3	−2.4	.7	−13.2
India	−10.3	−14.7	3.5	−11.7	−.5	2.5	−7.1
Indonesia	12.3	12.3	−1.9	−60.6	11.3	9.8	1.5
Philippines	−4.5	−.4	−4.2	−6.9	7.9	6.7	−2.9
Sri Lanka	−14.6	−20.7	−91.4	−2.0	.8	1.5	−8.5
Thailand	−1.5	−3.3	3.8	−6.5	−.6	10.0	−3.9
Latin America:							
Brazil	1.2	1.4	−.6	−8.3	−62.1	21.8	16.5
Dominican Republic	7.7	−.3	−.1	−11.0	−1.1	7.9	−3.0
Guatemala	6.4	3.2	−.4	−6.6	1.2	2.0	1.4
Haiti	10.1	−.5	6.5	11.9	2.7	9.2	10.7
Jamaica	10.7	2.1	1.6	−72.2	13.6	18.1	2.8
Paraguay	0	−3.0	−3.6	−3.8	17.9	13.8	3.0
Peru	7.1	−15.6	−16.2	−35.9	13.9	18.8	17.2

NA = Not available.

[1]Calculated as the difference between the world inflation rate (CPI for industrial countries) and domestic inflation rate plus or minus the change in the exchange rate (Special Drawing Rights rate). Negative sign denotes a depreciation in the exchange rate; a positive value indicates an appreciation in the exchange rate.

Source: *(22)*.

Table 10—Share of budget revenue from taxes on international trade

Region/country	Percentage of total revenue					
	1975	1976	1977	1978	1979	1980
	Percent					
Africa:						
Botswana—	50.1	31.8	22.6	38.3	36.9	41.1
Import duties	49.3	31.2	21.9	37.8	36.5	37.8
Export taxes	.8	.6	.7	.5	.4	.3
Kenya—	18.6	18.4	16.0	23.4	20.1	18.3
Import duties	18.6	18.4	16.0	21.7	19.6	17.5
Export taxes	0	0	0	1.7	.5	.8
Mali—	41.8	38.4	39.4	36.0	34.9	37.1
Import duties	38.8	33.1	27.3	30.4	31.0	33.3
Export taxes	3.0	5.3	12.1	5.6	3.9	3.8
Morocco—	30.3	34.6	37.0	34.1	29.9	30.3
Import duties	27.9	33.0	35.0	33.0	29.0	29.3
Export taxes	2.3	1.6	1.2	1.1	.9	1.0
Nigeria—	7.1	12.1	10.8	13.1	15.3	6.4
Import duties	7.1	12.1	10.8	13.1	15.3	6.4
Export taxes	0	0	0	0	0	0
Senegal—	NA	43.1	44.7	48.8	46.0	44.0
Import duties	NA	38.8	40.1	42.5	44.1	43.2
Export taxes	NA	4.3	4.6	6.3	1.9	.8
Sudan—	41.9	43.4	37.6	43.2	37.5	33.6
Import duties	36.7	37.8	32.1	38.0	33.1	30.3
Export taxes	5.2	5.6	5.5	5.2	4.4	3.3
Tanzania—	21.4	15.5	28.9	23.7	20.1	14.5
Import duties	14.0	11.5	13.0	14.7	13.4	8.9
Export taxes	7.4	4.0	15.9	9.0	6.7	5.6
Asia:						
Bangladesh—	23.4	35.6	30.3	33.1	35.6	36.6
Import duties	NA	NA	NA	NA	NA	NA
Export taxes	NA	NA	NA	NA	NA	NA
India—	NA	10.6	10.9	11.9	12.9	16.8
Import duties	NA	10.0	10.0	10.4	12.0	16.0
Export taxes	NA	.6	.9	1.5	.8	.8
Indonesia—	15.0	11.5	11.1	10.5	10.8	10.5
Import duties	11.5	9.2	8.9	8.2	6.9	4.7
Export taxes	3.5	2.3	2.2	2.3	3.9	5.8
Philippines—	35.5	26.0	20.5	18.3	14.6	10.5
Import duties	27.8	23.8	18.5	17.5	13.6	9.6
Export taxes	7.7	2.2	2.0	.8	1.0	.9
Sri Lanka—	16.9	22.1	54.8	56.6	58.6	50.7
Import duties	7.4	9.2	6.9	13.2	18.9	21.3
Export taxes	9.5	12.9	47.8	43.2	39.7	29.4
Thailand—	26.0	27.7	32.6	27.6	27.8	25.8
Import duties	20.7	24.2	28.7	24.4	23.5	22.0
Export taxes	5.3	3.5	3.9	3.2	4.1	3.8

See footnotes at end of table.   Continued—

Region/country	Percentage of total revenue					
	1975	1976	1977	1978	1979	1980
	Percent					
Latin America:						
Brazil—	10.9	9.7	7.8	7.6	7.8	13.4
Import duties	9.5	8.8	6.8	6.5	5.8	7.1
Export taxes	1.4	.9	1.0	1.1	2.0	[1]6.3
Dominican Republic—	50.9	43.6	61.2	46.7	45.3	41.1
Import duties	27.4	32.0	35.7	39.3	36.4	32.6
Export taxes	23.5	11.6	25.5	7.4	8.9	8.5
Guatemala—	27.9	29.2	42.1	39.9	36.3	34.8
Import duties	18.5	17.2	16.4	16.0	17.4	14.7
Export taxes	9.4	12.0	25.7	23.9	18.9	20.1
Haiti—	57.0	45.2	46.9	55.8	41.5	58.3
Import duties	22.1	24.2	24.9	34.4	24.7	34.6
Export taxes	24.9	21.0	22.0	21.4	17.4	23.7
Jamaica—	11.5	13.4	6.7	5.0	5.2	6.3
Import duties	11.2	13.1	6.5	4.8	4.8	5.9
Export taxes	.3	.3	.2	.2	.4	.4
Paraguay—	29.9	27.5	30.8	30.6	32.0	29.7
Import duties	28.1	26.1	29.5	29.6	31.1	28.9
Export taxes	1.8	1.4	1.3	1.1	.9	.8
Peru—	22.8	21.6	23.3	26.9	28.3	28.5
Import duties	20.7	16.1	12.8	14.8	12.3	15.7
Export taxes	2.1	5.5	10.5	12.1	16.0	13.3

NA = Not available.
[1]Includes coffee contribution quota.
[2]Includes taxes on foreign exchange transactions.

Sources: International Monetary Fund data and official country data.

Credit and input subsidies. Countries that intervened the most with direct producer pricing mechanisms also intervened the most in the supply and distribution of credit and inputs. In Tanzania, Mali, and Senegal, parastatals provide various inputs, both subsidized and nonsubsidized, directly to farmers: fertilizer, seed, chemicals, and farm equipment. Fertilizer has received the largest subsidy, reaching 90 percent in Tanzania. Different organizations serve farmers for food crops and export crops. The parastatals have a record of inefficiency and delivery problems. Senegal abolished some parastatals in 1980 and set up a mixed public-private system for distributing inputs. Senegal eliminated its fertilizer subsidy in early 1982. Although there are now virtually no subsidized inputs, Mali's system has favored export crop producers, especially cotton. Food crop producers organized into producer groups to the detriment of subsistence food producers. The credit programs have also tended to benefit large, better organized farmers over the small, subsistence farmers.

Nigeria and Botswana provide subsidized inputs to farmers. Government agencies distribute seed and fertilizer, and both the public and private sector distribute chemicals and other farm equipment to producers. Sudan provides a range of Government services for crops grown in the publicly controlled areas, with Government agencies responsible for supplying fertilizer and mixed public-private agencies distributing other inputs. Government involvement in the traditional agricultural sector has been very limited.

Kenya and Morocco have been less involved in directly supplying inputs. Morocco provides subsidized credit for the purchase of fertilizer and farm implements and has also maintained a large subsidy on fertilizer equal to 45 percent of the retail price in 1979. Most inputs in Kenya are supplied by the private sector, although prices are controlled by the Government. Kenya is the only country where the Government does not subsidize fertilizer, although the Government oversees the distribution of fertilizer.

Constraints to implementation. Each African country faces several constraints in executing agricultural policies: lack of administrative capacity to implement policies, lack of physical infrastructure which limits the extent and effectiveness of government controls, particularly in the rural areas, and budget limitations. In Kenya, Sudan, and Nigeria, rural marketing at the farm level is generally private rather than public, but the absence of competition among marketers results in farmers receiving low prices, often the government's minimum support price.

The domestic budget and the financial situation have been major constraints in some countries to implementing both producer price programs and subsidies on retail items, inputs, and credit. Marketing boards and trade agencies in Mali, Tanzania, Senegal, and Sudan have sold food grains and other staples at uniform, subsidized prices, creating large deficits which have been financed by government credit through price stabilization funds. The expansion in domestic credit through the banking system has contributed to inflationary pressures in the economies by increasing competition for the available credit. Mali and Senegal have financed their food subsidies partly through taxes on export crops, thus subsidizing food consumption at the expense of export crop production. Food subsidies in Morocco have also been considerable, equal to almost 15 percent of current Government expenditure in 1980, although they have been reduced recently to ease the impact on the budget. Although other countries have subsidized the retail price of specific items—for example, wheat in Nigeria and corn in Kenya—the impact on the budget has not been as severe.

Kenya, Mali, Morocco, Senegal, Sudan, and Tanzania are highly dependent on agricultural exports for both foreign exchange and government revenue (tables 3 and 10). Efforts to expand food crop production in Sudan and Tanzania have unintentionally discriminated against export crop production, with adverse consequences for the

balance of payments and the budget. Tanzania's export performance has deteriorated recently, and the relative contribution to the budget of taxes on international trade declined by 50 percent between 1977 and 1980. Nigeria and Botswana face less of a budget and foreign exchange constraint because they depend less on agricultural exports. The case studies of Kenya and Tanzania provide empirical estimates of the effect of government intervention on export market performance.

A lack of foreign exchange also constrains food imports because the necessity to import food reduces the amount of foreign exchange available for other imports. The ratio of cereal imports to total exports, providing an indication of the extent of the foreign exchange constraint, varies over time and was especially high for many countries during the food crisis years of 1973-75 and 1979-80 (table 11). Mali, Senegal, Tanzania, and Morocco appear to have had the greatest constraint, and Nigeria, Kenya, and Botswana the least, although Morocco's and Kenya's balance of payments are currently under great pressure. These ratios have fluctuated considerably, reflecting both fluctuations in export earnings and cereal production. However, concessional cereal imports have been an important source of supply in certain years for each country except Nigeria (table 12). These imports may have helped lessen the foreign exchange constraint, but they also tend to fluctuate considerably reflecting donor supplies, world prices, and other factors.

Summary. Government policy has not been implemented effectively or consistently with stated policy objectives in many African countries. There has been a lack of movement toward achieving food self-sufficiency. The objective of consumer welfare has implicitly received high priority. Producer prices have not kept pace with domestic inflation or followed world market prices. The retail price of basic cereals in most countries has been subsidized, and cereal imports have increased as a share of consumption for many countries.

Government procurement and marketing of grain in most of the African countries have been small relative to total production and not large enough to either effectively support the official price or to have a significant impact on production. The low level of grain production marketed through government boards indicates lack of profitability for the farmer and inefficient marketing arrangements. Although Sudan and Tanzania have adapted policies consistent with increasing food production, such as favorable relative prices, this policy has unintentionally contributed to a decline in export crop production that has exacerbated balance-of-payments problems. Export crops and import

substitution crops rather than basic grains appear to have received priority in Mali, Morocco, and, possibly, Kenya.

All countries have subsidized consumption of various food items at times during the past decade to control inflation or maintain low prices. Official retail prices for major food items have lagged behind the rate of inflation in most countries. By causing lower food prices relative to other prices, however, subsidies in some countries have encouraged demand met partly through cereal imports. Cereal imports as a share of consumption are substantial for Botswana,

Morocco, Senegal, Nigeria, and, occasionally, Tanzania and have been a drain on foreign exchange earnings for Mali, Morocco, Senegal, Tanzania, and Kenya. Overvalued exchange rates, although not an explicitly stated policy, have also encouraged cereal imports. Thus, many of the African countries are not moving toward their stated objective of food self-sufficiency.

Objectives have been overly ambitious in some countries and resources have not been sufficient to achieve them. This situation shows up clearly in the domestic financial

Table 11—Cereal imports as a percentage of total exports[1]

Country	Average 1969-71	1972	1973	1974	1975	1976	1977	1978	1979	1980
					Percent					
Africa:										
Botswana	16	12	12	2	5	2	3	4	4	2
Kenya	1	1	2	1	2	*	*	2	1	6
Mali	7	22	47	81	64	7	4	16	9	10
Morocco	6	6	14	11	18	14	13	1	15	14
Nigeria	3	2	2	1	1	2	3	5	2	2
Senegal	21	12	35	24	11	15	13	17	18	20
Sudan	5	4	6	8	5	6	3	5	9	15
Tanzania	2	4	1	27	29	3	6	6	3	21
Asia:										
Bangladesh	NA	62	104	111	150	67	18	47	20	82
India	17	3	17	21	34	24	3	2	*	*
Indonesia	17	12	14	6	6	6	7	6	5	4
Philippines	5	9	6	5	7	6	3	3	3	3
Sri Lanka	26	18	30	48	56	30	30	23	19	18
Thailand	*	*	*	*	*	*	*	*	*	*
Latin America:										
Brazil	6	4	6	7	5	6	3	6	7	7
Dominican Republic	3	2	4	11	8	12	6	6	4	7
Guatemala	2	2	3	4	4	2	1	2	2	3
Haiti	11	10	20	23	24	21	25	14	22	22
Jamaica	8	9	13	13	11	12	7	9	6	11
Paraguay	7	4	3	6	2	5	2	2	3	4
Peru	6	7	10	10	21	13	10	7	6	9

NA = Not available.

[1]Includes food aid in cereal imports.
* = Less than 1 percent.

Sources: International Monetary Fund and the Food and Agriculture Organization of the United Nations.

situation of Mali, Senegal, Tanzania, and Sudan. Mali and Tanzania, in particular, have attempted to control almost all aspects of the food and agricultural sector to achieve self-sufficiency, but the public sector has been inefficient and substantial parallel markets exist. Higher income urban consumers have generally benefited from subsidized food, despite the objective to help low-income or undernourished people. Thus, the objective of consumer welfare has received implicit priority despite the explicitly stated objectives of emphasizing producer welfare and food self-sufficiency.

However, several countries—for example, Mali, Senegal, Morocco—have recently made significant changes in certain aspects of their food policies. These countries are attempting to reduce the extent of government intervention and have recently reduced food subsidies and increased producer prices. The role of government parastatals in food marketing is being evaluated with an eye toward limiting their role.

Asia

Production and marketing controls. The six Asian countries reviewed are quite poor, three with per capita GNP near

Table 12—Concessional cereal imports as a percentage of total cereal imports

Country	1975	1976	1977	1978	1979	1980
				Percent		
Africa:						
Botswana	45.0	24.3	56.7	14.7	8.6	NA
Kenya	2.6	75.7	24.2	10.7	30.0	33.2
Mali	45.7	1.2	78.1	68.0	33.7	55.8
Morocco	4.9	3.5	9.1	8.9	8.6	6.4
Nigeria	1.5	*	0	0	0	0
Senegal	12.9	5.6	7.3	38.9	14.9	11.8
Sudan	39.9	14.4	48.9	38.4	26.0	55.9
Tanzania	59.1	[1]142.6	96.1	100.0	51.0	23.1
Asia:						
Bangladesh	92.9	76.6	82.3	78.5	83.1	82.5
India	14.4	18.6	64.8	85.4	94.5	NA
Indonesia	21.2	5.8	28.9	35.2	27.4	23.0
Philippines	10.8	7.0	6.8	10.9	13.1	9.6
Sri Lanka	23.3	47.2	42.7	26.6	25.5	20.2
Thailand	0	0	0	1.5	3.7	1.4
Latin America:						
Brazil	1.4	*	*	*	*	*
Dominican Republic	6.9	7.8	4.8	14.2	11.8	26.7
Guatemala	6.1	24.4	7.5	4.1	4.2	4.4
Haiti	28.4	32.3	37.1	37.9	34.9	28.6
Jamaica	*	1.7	4.1	29.2	21.0	26.3
Paraguay	39.8	*	34.3	8.6	27.0	9.5
Peru	3.2	2.9	1.9	3.4	14.1	6.9

NA = Not available.
* = Less than 1 percent.
[1]Due to discrepancies in the data.

Sources: U.S. Department of Agriculture and Food and Agriculture Organization of the United Nations.

or under $200 (table 13). The agricultural sector contributes between a quarter and a third of GNP for every country except Bangladesh where the share is much higher. Economic growth in the seventies was rapid—nearly 8 percent—in Indonesia and Thailand, and nearly as good in the Philippines at 6.2 percent. The other three countries achieved yearly growth rates of between 3 and 4 percent.

Indonesian economic growth has been sustained by the petroleum industry. The agricultural sector performed well with a growth rate of 3.6 percent annually. Thailand and the Philippines had much faster agricultural growth of around 5 percent annually. The three poorest countries—Sri Lanka, India, and Bangladesh—had slower growth rates in agriculture of 2 percent or less per year during the seventies, although growth in food grain production in India was much higher. If 1980 and 1981 data are combined with the seventies' data, the growth rate for Indian agriculture reaches 2.5 percent.

Agriculture's share of export earnings varies widely among the Asian countries. Thailand, Sri Lanka, and the Philippines depend on agricultural exports for over 50 percent of export earnings. Agriculture employs over 50 percent of the labor force in each country and almost 75 percent in Bangladesh and India.

Bangladesh maintains low producer prices relative to world prices for rice and wheat as a means to keep consumer prices low. Producer prices for paddy have fluctuated more than the CPI, and producer prices for rice and wheat lagged behind the CPI during the seventies (table 7). Paddy production increased at a moderate rate during the seventies and early eighties. Wheat production, although insignificant compared to rice, showed marked expansion during the same time period, primarily due to use of high-yielding varieties. The Government has favored extensive fertilizer and inputs subsidies to provide incentives to farmers rather than maintain high producer prices.

Retail prices for rice and wheat are subsidized below world price levels through the public distribution system. Domestic procurement accounts for about 20-25 percent of the ration system, but this equals less than 5 percent of total food grain production (table 7). The Government uses open market sales from its stocks of rice to stabilize prices, although these sales have been small. About 60 percent of the Government procurement goes to urban areas and about 40 percent to rural areas. About 25 percent of the total population has access to the ration system. The subsidy averages about 30 percent, although prices have been raised recently. The official retail price for wheat and rice did not keep pace with inflation during the late seventies. The ration consisted of two parts wheat and one part rice. Concessional wheat imports have been an important component of the ration system which provides 1.5 to 2.0 million tons of food grains annually, about 11 to 13 percent of total consumption. Cereal imports have accounted for a large share of both total imports and consumption (tables 5 and 6).

India intervenes extensively in both production and consumption of rice and wheat, its major food grains. India

Table 13—Basic economic indicators of selected Asian countries

Country	Per capita GNP, 1980	GNP annual growth rate, 1970-80	Agriculture annual growth rate, 1970-80	Agriculture's share of GDP, 1980	Agricultural share of exports, 1978	Agricultural labor force, 1980	Per capita food production 1980
	U.S. dollars	- *Percent* - - - - - - - - - - - - - - - - - - -					*1969-71 = 100*
Bangladesh	130	3.9	2.2	54	NA	74	96
India	240	3.6	1.9	37	30	69	97
Indonesia	430	7.6	3.8	26	26	58	124
Philippines	690	6.3	4.9	23	52	46	108
Sri Lanka	270	4.1	2.8	28	81	54	113
Thailand	670	7.2	4.7	25	64	76	137

Sources: *(16, 52, 53, 55).*

also maintains controls on other staple crops, although less effectively than on wheat and rice. The Government has traditionally had both a support and procurement price for food grains. However, the procurement price has in essence become the support price because the support price has been too low to be effective. Procurement prices have been increased annually in recent years, but generally more slowly than the inflation rate.

A major policy instrument used in connection with procurement prices is zone restrictions. When movement of grain between zones is restricted, prices are artificially distorted between surplus and deficit regions. Thus, movement restrictions enable the Government to procure successfully in surplus regions for distribution in deficit regions. Zone restrictions are no longer formally imposed by the Government, but individual states still impose less formal restrictions on private movements during certain seasons to ensure meeting procurement targets. Movement restrictions have varied with the overall supply situation and have been more prevalent during periods of tight supplies.

The procurement process varies by commodity with different Government agencies involved at both the producer and processing level. Government procurement represents about 10 percent of the marketed surplus of food grains, with higher percentages for wheat and rice than for coarse grains (table 7). Procurement of pulses is nil as support prices have been well below actual prices. Staples are channeled into the fair price shops, where they are sold at subsidized prices. Most fair price shops are located in urban areas although there is now emphasis on expanding rural distribution. A recent trend has been for the Government to reduce the retail subsidy and provide a higher price to producers. Although stocks have dwindled in recent years, government policy has been to maintain stocks to provide adequate supplies for the public distribution system and food security in the event of a production shortfall.

Imports have been an important source of supply for the stocks and fair price shops, especially for wheat. Prior to 1977, cereal imports were a significant share of total imports and of the total distribution of cereals, although they were not large relative to total consumption. However, improved production in recent years and large stocks built up through imports have sharply reduced the level of imports (tables 5 and 6). India's stock policy allowed it to avoid large cereal purchases after drought in 1979 seriously affected production. India imported wheat in 1981 for the first time since 1977 after large drawdowns of stocks jeopardized both the public distribution system and food security.

Indonesia's food policy has focused on maintaining stable rice prices to protect both producer and consumer welfare. Programs were begun in the midsixties to provide inputs and technical assistance to farmers. In turn, the Government set a floor price at which it would purchase the crop. These early programs focused on rice, but procurement amounted to only 2 to 5 percent of production during the seventies (table 7). These policy instruments are now being extended to secondary food crops: corn, cassava, soybeans, peanuts, and sweetpotatoes. Annual increases in floor prices began in 1973/74, and producer prices increased substantially in recent years as the Government attempted to improve producer incentives (table 4). The programs ran into difficulties in the midseventies, and in 1979 the Government began a new collective approach to improve management and debt responsibilities.

The Government maintains a retail price ceiling for rice and wheat to keep prices within reach of low-income consumers. Stocks are released to retail markets during periods of high prices, such as immediately prior to harvest time. Also, the Government marketing agency (BULOG) may sell foodstuffs directly to desired retail outlets. Government distribution increased from more than 8 percent of rice consumption in 1974/75 to a peak of about 18 percent in 1977/78, but has since declined slightly. The retail price of wheat has been subsidized as part of Indonesia's policy to lessen dependence on rice and to provide a low-cost staple that satisfies nutritional requirements. BULOG has also attempted to control retail prices of sugar.

As a supplement to the low level of domestic procurement, cereal imports are necessary and account for 80-90 percent of cereals distributed by the Government. Cereal imports have been increasing as a share of cereal consumption, but declining slightly as a share of total imports (tables 5 and 6). Rice imports declined sharply in 1981.

The Philippines intervenes to some extent in the production and marketing of basic grains although rice and corn are also marketed by private traders. The Philippines first achieved self-sufficiency (no imports) in rice in 1977, reaching one of its primary agricultural objectives. Producer prices for basic grains were raised steadily between 1970 and 1975 to stimulate production, although the rate of increase of prices has since declined. The Government now focuses its efforts on corn production to meet rising needs for food and feed. A program was introduced in 1978 to provide fiscal incentives to priority agricultural items: livestock, poultry, feed grains, hybrid seeds, citrus fruits, and rubber. Export crops received price supports similar

to those of food grains during the seventies as the Government pursued a policy of export promotion. Both food and export crop production has slowed in recent years, and some rice imports may again be necessary.

The Government regulates prices on essential food items: rice, sugar, wheat flour, and edible oils. The Government has acquired sizable rice stocks in recent years that have helped stabilize consumer prices as a result of effective price supports and increased production. The Government is the sole importer of wheat and subsidizes sales to millers. Price controls were removed in June 1979 only to be reimposed in February 1980 as inflation accelerated. Retail food prices have generally increased at about the same rate as the CPI. Cereal imports have been declining relative to total imports and consumption. Imports have been used in the past to supplement domestic supplies and help maintain low consumer prices (tables 5 and 6).

Prior to 1977, Sri Lanka's food policy emphasized stable and adequate consumption for the population. The policy was implemented by an extensive public distribution scheme that provided a free ration of rice and wheat to nearly the entire population. The Government procured about 33 percent of the rice crop, but maintained low producer prices to keep procurement costs down (table 7). Producer prices were raised at a rate slower than the increase in the CPI.

Per capita food production declined steadily between 1970-1977. Faced with declining food production and increasing budget costs, the new Government radically altered the prevailing food policy. The Government first adjusted retail prices for wheat and rice, raising wheat prices much higher than rice prices. Retail wheat prices rose twice as fast as the CPI (table 8). The public distribution system was changed in 1979 from a free ration system to a food stamp system with tightened eligibility requirements. The changes reduced public provision of food grains from over 50 percent of total consumption prior to 1977 to about 30 percent of total consumption in 1980. Government procurement of domestic rice declined from 31 percent of production in 1977 to 15 percent in 1980 as private traders entered the market (table 7).

In conjunction with changes in the public distribution system, the Government also increased producer prices for rice, as much as 25 percent in 1980. Rice production has increased substantially since 1977, owing partly to higher retail prices and greater demand for rice stemming from the even greater increase in wheat prices. However, increases in secondary food crop production (corn and

cassava) have leveled off since the early seventies as rice has become the favored domestic crop. The Government also procures a wide range of other crops at fixed prices, and the country has become self-sufficient in several nonstaple food items. Government policies since 1977 have succeeded in reducing cereal imports that have traditionally constituted a large share of both total imports and consumption (tables 5 and 6). However, the country is currently facing a severe drought and food imports are likely to rise. The new policies have also exacerbated inflation.

Thailand's food policies, especially for rice, stand out among Asian countries because Thailand is one of the world's few net food exporters. The Government has tried to support producer prices for rice, sugarcane, corn, cassava, and other crops since the late seventies. However, there has been no comprehensive crop price policy, but rather several types of ad hoc Government interventions that have varied from crop to crop and year to year. The interventions have generally failed to achieve their goal, with the exception of sugarcane, where the Government has helped millers and producers negotiate fixed producer prices and made up losses that the millers subsequently incurred.

In the last 2 years, the Government has increasingly tried to use the private sector to help support farm prices and has increasingly considered letting the agricultural markets find their own price level, with Government intervention restricted to exports and imports of farm goods. While no such decision has yet been reached, and domestic interventions by the Government are currently going on, 1981 and 1982 saw a series of significant changes in the heavy charges that the Government has traditionally levied on farm exports, particularly rice.

The export duty on rice, used for general Government revenues, has been maintained. However, the rice premium used by the Government to pay for part of its farm price support programs or to subsidize fertilizer payments was sharply reduced in a series of steps in 1981 and 1982. And the rice reserve requirement, which involved sale of a certain amount of rice at a low price to the Government for permission to export given quantities, was first reduced and then completely lifted in May 1982. The total effect of the changes in export payments was to allow Thai private exporters to reduce their sales prices overseas, thus becoming more competitive, without suffering losses to themselves. It is expected that these changes will increase export demand and eventually producer prices. Thailand has served notice that it will use its export payments to influence volume and value of export more than in the past.

The three export charges can be raised/reinstated if market conditions change.

The Government has traditionally exhibited more concern over retail prices in Bangkok than over farm prices, and sold at low retail prices the rice that it received from the rice reserve requirement and other channels. Foreign exchange earnings, farm income, and producer prices lately have assumed greater importance to the Government. Without the rice reserve requirement, the cheap retail sales have become very expensive to the Government. The future of such sales is in doubt.

Trade controls and exchange rates. Each country except Thailand has a government monopoly over the import of wheat and rice. This government intervention is an extension of the public food distribution system in Bangladesh, India, Sri Lanka, and Indonesia, since cereal imports are an important part of the distribution system. Most countries also maintain export controls on grains. Thailand regulates rice, corn, and cassava exports through a licensed quota system. Most other countries either maintain a government monopoly or require export licenses for grains and other staples.

Bangladesh, India, and the Philippines have had depreciating exchange rates compared to relative changes in domestic and international prices. Several countries have used devaluation as a policy tool to counter a shortage of foreign exchange. Indonesia devalued in 1978 to offset higher domestic inflation compared to world inflation. Bangladesh devalued in 1975 and Sri Lanka in 1977. Exchange rates in the higher income countries—Indonesia, Philippines, and Thailand—tended to appreciate in 1980.

The Asian countries rely on taxes on international trade for differing proportions of total revenue (table 10). The lower income countries of Bangladesh and Sri Lanka depend on trade revenues for over 30 and 40 percent of budget revenue, respectively. The remaining countries receive about 30 percent or less of their budget revenue from trade revenues. The relative contribution of trade revenues in the Philippines has been steadily decreasing. Most countries receive a much larger share of revenue from import duties than export taxes. Only Sri Lanka, which depends on tea, rubber, and coconuts for 80 percent of export earnings, derives a large share of revenue from export taxes. However, this source has been declining since 1977, whereas the share of revenue from import duties has been increasing. Export taxes have been used in Thailand to restrict rice exports to maintain adequate domestic supplies and in Indonesia to maintain ample agricultural raw materials for domestic processing industries.

Credit and input subsidies. Each Asian country maintains a subsidy on fertilizer, but the extent of government intervention in procurement and distribution of fertilizer varies by country. Sri Lanka and Bangladesh until recently have maintained complete control over the importation and distribution of fertilizer. Retail prices in both countries are heavily subsidized. Prices in Bangladesh have been 30 to 50 percent below cost and below those in both India and Pakistan. Low prices contributed to a doubling of fertilizer use per hectare between 1973/74 and 1979/80. Between 1977 and 1980, Bangladesh Government expenditures on the fertilizer subsidy were larger than for the food grain subsidy. However, prices of many subsidized grains were raised in 1979, and the Government has just turned over retail fertilizer trade to the private sector to encourage wider distribution and reduce budgetary costs. Bangladesh has also maintained large subsidies on irrigation water, seeds, and pesticides. Sri Lanka has set retail prices of fertilizer 30-40 percent below import prices, but is considering reducing the subsidy in the face of higher prices. The fertilizer subsidy equalled over 6 percent of Government revenue in 1980 and 1981.

Indonesia has had programs to provide credit, inputs, and technical assistance in connection with its price support program. The Government has provided a large subsidy for fertilizer by maintaining the price at a favorable rate relative to the producer price for rice. Fertilizer prices have remained unchanged since 1977, whereas the rice support price has increased almost 95 percent. The subsidy is intended to provide an increase in real income and to encourage use to improve productivity.

India has both private and public distribution of fertilizer, although the Government has a monopoly on fertilizer imports. Prices have been subsidized about 15 percent below costs. Almost all fertilizer is imported in Thailand, but distribution is mostly in private hands. Prior to 1980, the Government subsidized about 20 percent of fertilizer consumption at prices 20-25 percent below market prices. The Philippines permits private participation in the distribution of fertilizer, but the Government imports fertilizer when local production costs are higher than tax-free imports. Almost 75 percent of the Philippines' annual fertilizer requirement is imported. The Government also has programs to provide technical assistance, improved seeds, and subsidized credit. In late 1981, the Philippines president announced that the fertilizer subsidy begun in 1973 would be phased out for producers of rice, corn, and vegetables.

Constraints to implementation. Rural areas are generally not as well served by public distribution systems as are

urban areas. High costs of the less centralized rural distribution and the lack of effective demand, even at subsidized prices, are constraints to expanded rural distribution. The one exception is Sri Lanka whose extensive distribution systems covers both urban and rural areas.

A second, more serious problem faced by most countries is the budget constraint imposed by the marketing system. The marketing system, designed to provide low-cost food for the poor and usually urban population, is expensive because the cost of procuring, storing, and transporting commodities is greater than the selling price. Thus, governments with public food distribution have had to subsidize these programs. The subsidies have also represented a large share of the government budget for some countries. Food subsidies in Bangladesh equalled about 25 percent of Government expenditure in 1972/73. The share dropped to 11 percent in 1978/79, although actual expenditures increased nearly 70 percent. Expenditures on food stamps and food subsidies in Sri Lanka equalled about 20 percent of Government revenue in 1978, although this share declined to an estimated 11 percent in 1981 as the Government scaled down its activities.

Lack of foreign exchange with which to import either food grains or other needed imports has plagued the three poorer Asian nations (Bangladesh, India, and Sri Lanka) over the past decade while presenting less of a problem for the higher income countries (Indonesia, Thailand, and the Philippines). The three lower income countries showed a much higher proportion (20 to 30 percent or more) of export earnings spent on cereal imports than the higher income countries (generally 7 percent or less) (table 11). Most countries exhibited sharply increased costs during the 1973-75 world grain shortages. India was forced to allocate 20 to 35 percent of its export revenue to grain imports during the 1973-75 shortfalls while Bangladesh and Sri Lanka spent even more. As production increased, however, India reduced its cereal imports in the closing years of the decade to the same level as that of the higher income nations—less than 5 percent of export earnings. Indonesia achieved a similar reduction beginning in 1974 when petroleum export prices quadrupled, causing a sharp increase in export revenues.

Concessional cereal imports have been substantial relative to total cereal imports for Bangladesh, Indonesia, and Sri Lanka (table 12). Commercial cereal imports in India have been small in recent years. Indeed, India was a net exporter of wheat in 1978 and 1979. Food aid has been small relative to total cereal imports when cereal imports were large (1975 and 1976). But food aid was large relative to total cereal imports when total cereal imports were small, as during 1977-79. Thailand has received small amounts of food aid recently in connection with the large influx of refugees.

Summary. A major government priority for most Asian countries discussed here has been to maintain low cereal prices for consumers. The governments of these countries have subsidized the retail price of cereals, primarily rice and wheat, through public distribution programs. Thus, the stated objectives receiving priority in the Asian countries appear to be consumer welfare and food security.

The most extensive food distribution programs appear in countries with the lowest per capita incomes: Bangladesh, India, and Sri Lanka. In India and Bangladesh, however, a disproportionate share of benefits of the programs has tended to go to urban rather than rural consumers. Benefits were widely dispersed in Sri Lanka prior to 1977. The programs have contributed to increased consumption and improved nutrition, but at the cost of large Government expenditure and increased food grain imports, particularly in Bangladesh and Sri Lanka.

The higher income countries—Indonesia ($300 per capita annual income), Thailand ($590), and Philippines ($600)—also attempt to maintain low consumer prices. The emphasis has been on controlling prices indirectly through reserves and export policies rather than directly through large public distribution systems, although Indonesia and Thailand do have limited public distribution programs that target low-income consumers. The Philippines has no direct food distribution program, but implements price and trade controls to restrain food prices. The Philippines has undertaken a food sector strategy in conjunction with several international institutions to improve the nutritional adequacy of diets of low-income populations.

Each Asian country stated increasing food production and farmer income as objectives of their food policies. However, increasing producer income did not receive priority for most countries as producer prices were set below import parity levels, and price increases lagged behind increases in the CPI. Thailand, which only recently included producer welfare as an objective, taxed rice producers heavily during the seventies and maintained consumer prices below export prices. Rather than directly supporting producer prices, governments preferred to use input subsidies as the means to improve producer welfare while restraining increases in retail food prices. The input

subsidies have required large government expenditures. The Philippines, however, had an effective price support program for rice which contributed to increased production and stocks.

Several countries reoriented their production policies at the end of the seventies in response to poor production and the growing cost of cereal imports and subsidies. Regular increases in producer prices were begun in Bangladesh and Sri Lanka. Sri Lanka and India have recently raised retail prices in an attempt to reduce the subsidy to consumers. As fertilizer prices rose following the oil price increases, governments were also forced to reduce subsidies on fertilizer and other inputs. Each counry appears to emphasize direct production policies, recognizing that consumption gains cannot be made at the expense of production.

Latin America

Production and marketing controls. Per capita GNP for the Latin American countries ranges from $270 in Haiti to more than $2,000 in Brazil. Economic and agricultural growth rates during the seventies varied considerably among countries. Brazil, Paraguay, Guatemala, and the Dominican Republic had impressive growth rates in 1970-79, while Jamaica, Haiti, and Peru lagged far behind (table 14). This performance is also reflected in the level of per capita food production. In 1980, Jamaica, Haiti, and Peru were at a level below that achieved a decade earlier.

Agriculture's contribution to the economy shows up most clearly in export earnings. Agriculture's share of exports

ranges from 50 to 75 percent of total exports for each country, except Jamaica and Peru. The agricultural sector is relatively less important to the total economy than it is in Africa, although agriculture contributes over 25 percent of GNP in Guatemala, Haiti, and Paraguay. The agricultural sector employs at least 50 percent of the workforce in four of seven countries.

The Peruvian Ministry of Agriculture sets producer prices for most major commodities: wheat, rice, yellow corn, sorghum, and soybeans. Producer prices generally kept pace with inflation until the late seventies, when official producer prices for major staples fell below world market prices (rice by 40 percent, corn and cotton by 10-15 percent, and beef by 30-40 percent). The agrarian reform program of the seventies focused on institutional changes and providing support services and technical assistance. However, the agrarian reform was not successful, and food output suffered from a deterioration of irrigation facilities, loss of personnel from the extension service, and a lack of credit for both small farmers and long-term investment.

Cash crop production also suffered during the seventies, especially cotton and sugar. The agrarian reform program attempted to organize farmers into cooperatives. Labor-management disputes developed on the cash crop estates leading to a loss of skilled personnel. This development, along with inconsistent price and tax policies, contributed to declining yields and production. The requirement that a fixed percentage of cultivated land be planted in food

Table 14—Basic economic indicators of selected Latin American countries

Country	Per capita GNP, 1980	GNP annual growth rate, 1970-80	Agriculture annual growth rate, 1970-80	Agriculture's share of GDP, 1980	Agricultural share of exports, 1978	Agricultural labor force, 1980	Per capita food production, 1980
	U.S. dollars	- - - - - - - - - - - - - - - - - - *Percent* - - - - - - - - - - - - - - - - - -					*1969-71=100*
Brazil	2,050	8.4	4.9	10	55	30	136
Dominican Republic	1,160	6.6	3.1	18	75	49	100
Guatemala	1,080	5.7	4.6	26	26	55	100
Haiti	270	4.0	2.2	NA	NA	74	93
Jamaica	1,040	−1.1	.7	8	NA	21	88
Paraguay	1,300	8.6	6.9	30	NA	49	120
Peru	930	3.0	NA	8	NA	40	79

NA = Not available.
Sources: *(16, 52, 53, 55).*

crops displaced cash crops, especially cotton. Cotton production has begun to increase following increases in producer prices in 1977, but sugar production remains stagnant.

Peru, with a history of Government-administered retail prices, controls prices for most basic foodstuffs. Prices of perishable food items sold in the Lima-Callas area were regulated by a municipal body created to control speculation. The Ministry of Agriculture has set prices based on its expectations about world inflation and its willingness or ability to subsidize consumption. Nominal food prices have been increased annually, but real food prices have fluctuated depending on the inflation rate (table 8). Real prices of basic staples—rice, soybeans, corn, sorghum, sugar—declined in 1980, but retail prices were increased substantially in 1981. Wheat and rice have been heavily subsidized and the subsidy has contributed to growing imports. Cereal imports have remained fairly constant as a percentage of total imports, but have been increasing as a share of consumption (tables 5 and 6).

The marketing agency, ENCI, handles domestic marketing of most imported foodstuffs, including dairy products and oilseeds. Marketing of domestically produced crops—potatoes, corn, and beans—is much smaller. ENCI procures, transports, and for corn, stores these commodities. ENCI competes with the private sector in urban areas, but controls almost all marketing in the sparsely populated jungle areas. ECASA, a subsidiary of ENCI, markets imported wheat and rice. Most domestic wheat is consumed by producers and is not marketed. A quasi-government agency handles sugar marketing and exports, although a private sugar cooperative was recently given permission to market sugar directly.

The new Government elected in 1980 has given its highest priority to improving the food situation. The new Government favors a more market-oriented approach for the agricultural sector than the previous Government, although Government intervention in the food economy remains strong. The new Government is attempting to improve productivity in the agricultural sector through administrative and other reforms and to reduce its role in agricultural marketing.

The Dominican Republic sets producer price supports for all the major staples—rice, beans, corn, sugar, bananas, plantains, and potatoes—through INESPRE, the price stabilization institute. The level of price support for many commodities has not changed for several years, resulting in a decline in real producer prices. Storage facilities have

been inadequate to allow meaningful intervention to support prices. Rice production has increased substantially during the seventies, but corn and sorghum production has been stagnant.

INESPRE sets retail prices for all the basic staples: cereals, vegetable oils, legumes, and others. The amount of intervention varies by commodity. Rice mills have been required since 1970 to sell all rice production to INESPRE at controlled prices. INESPRE controls the retail price of rice because it has a monopoly position at both the wholesale and retail level. It also purchases corn to ensure the minimum price for producers. However, very little corn is purchased, only about 3 percent of production in 1975. Wheat, not grown domestically, is imported by INESPRE under P.L. 480 and from private sources. The wheat is consigned to state-owned mills for storage, processing, and distribution to retail outlets. Selling P.L. 480 commodities below producer support prices may have depressed production of corn and sorghum.

Cereal imports have been increasing in relation to cereal consumption, although cereal imports have decreased relative to total imports (tables 5 and 6). This increase partly reflects greater imports by INESPRE in compliance with Government objectives of securing adequate food supplies.

The Brazilian Government employs a variety of production-oriented instruments, including minimum price supports for a wide range of crops: rice, beans, manioc, corn, soybeans, and sorghum. The minimum prices often lagged behind the rate of inflation in the midseventies, although the Government raised prices considerably in 1980 and 1981 (table 3). The Government uses two basic tools to support its minimum prices. The first is a loan which permits the producer to hold commodities off the market, either on the farm or in a Government-designated warehouse, until prices improve. If market prices do not rise above the minimum price, the Government is willing to acquire the commodities for the minimum price. Government procurement has generally been less than 10 percent of production (table 7). Cost of production, anticipated world market prices, and domestic market requirements are important determinants in setting minimum prices.

The producer price system was reorganized in 1981 to ensure producers are paid at least their actual cost of production. New "basic" prices were established with an allowance for increases in production costs as measured by changes in the CPI. The 1981/82 basic prices for 15 major commodities were raised an average of 60 percent more than the 1980/81 prices. However, these increases were below the rate of inflation.

Wheat is a priority item for the Government. The Government announces a purchase price for wheat through the Bank of Brazil which buys all wheat production. Brazil maintains wheat support prices high enough to cover all costs and provide a good profit margin to the grower.

Brazil's agricultural performance during the last decade has been impressive, particularly for soybeans. However, there are several exceptions to the overall improvements in production. Climatic drawbacks appear to limit wheat production, and the minimum price system has not focused sufficiently on beans and cassava. Production of these items has not kept pace with the overall rate of increase in population. To encourage greater production of beans and cassava, the Government has recently raised minimum prices well above the rate of inflation.

Brazil has maintained extensive price controls on most food items since 1967 to control inflation. State marketing arrangements exist for wheat, rice, corn, and cassava. The rice institute maintains stocks to curb speculation and to assure adequate supplies. Beef stocks are also maintained to prevent price fluctuations. The Government buys beef at agreed prices during the slaughter season and sells it at controlled prices during the dry months.

The Government began a policy of price liberalization in mid-1980. Many agricultural products were freed from price controls and consumption subsidies were reduced. Wheat has been heavily subsidized with wholesale prices declining in the face of rapid inflation (table 8). As of early 1981, only wheat, milk, and beef had subsidized prices. The wheat subsidy was gradually reduced and was eliminated by December 1982. Cereal imports increased substantially during the seventies and represent a growing share of cereal consumption (tables 5 and 6).

The Jamaican Government began a guaranteed minimum price program for basic food crops in the early seventies. A Government-owned corporation (AMC) purchased food crops from farmers at market prices for distribution to retail stores and large public institutions. The AMC was also obligated to buy surplus products at a minimum price. However, shortages of food imports, which helped raise prices for food crops relative to export crops, probably contributed more to higher prices than Government programs. The new Government is examining the role of the AMC as part of its agricultural policy review.

The Government is also heavily involved in export agriculture. Commodity marketing boards guarantee minimum prices for sugar and bananas, the two major agricultural exports. However, export agriculture has not fared as well as the domestic sector. Sugar production and exports have declined as a result of a lack of capital investment and inadequate incentives for producers. Subsidized retail sugar prices have tended to keep producer and export prices below costs of production.

There are direct price controls on basic food items: bread products, rice, sugar, dairy products, and meats. Government-designated agencies set prices at both the wholesale and retail level and ration supplies to regional distributors. Price controls were increased in 1975 from 45 to 100 products, and the Government began to subsidize many food items. However, to reduce Government expenditure and improve marketing efficiency, the Government in 1978 raised prices of basic food items and reduced food subsidies. The new Government decontrolled many prices in mid-1981, but retained price controls on the basic staples. Food subsidies were maintained at their nominal level for 1980/81 which resulted in a decline in the real level of subsidization. Jamaica depends on cereal imports for almost all its consumption needs, but cereal imports have equalled less than 10 percent of total imports (tables 5 and 6).

Guatemala's state marketing agency (INDECA) was created in 1971. INDECA, responsible for supporting producer prices of basic staples, sets support prices at different levels throughout the country as part of its program to stabilize prices in the capital city. The average support price for corn and wheat has been considerably above the world price, whereas the rice price has been set much lower than the world price. Producer prices for basic staples were reduced in 1976, but were raised for most crops in 1977, 1978, 1980, and 1981 (table 4). However, the support price for wheat has been unchanged since 1974. Between 1975 and 1980, producer prices generally were increased at a slower rate than inflation. The Government has had obligatory planting regulations for basic staples, but INDECA's price support program appears to have had little effect on production, partly because of inadequate storage facilities.

There is little direct Government intervention in export crops, apart from market stabilization measures which are temporary. The Government sets producer prices and marketing quotas, but marketing and exporting are generally in the hands of the private sector.

Guatemala has a history of retail price controls which were intensified in 1976 following a devastating earthquake.

Price controls were extended to about 50 items, and more than half of these were food products. Controls were loosened in 1977, but were retained for the basic staples: grains, oils, flour, meat, and milk.

INDECA controls retail pricing and marketing of basic grains through the use of reserves and imports to assure supplies. INDECA subsidizes the retail prices of certain items distributed through Government stores to target low-income consumers. For example, the ratio of the INDECA price to the average retail price in 1976 was 42 percent for corn, 46 percent for beans, and 50 percent for milled rice. Cereal imports have been low relative to total imports and have averaged about 15 percent of cereal consumption (tables 5 and 6).

Price controls have created distortions in some markets. Sugar millers claim fixed prices are too low and they are losing money. Low controlled prices for cottonseed and cottonseed oil have discouraged competition from other oilseeds. Imports have been necessary to meet local demand because prices have been too low to induce enough crushings.

Haiti has no direct Government intervention in the production and marketing of food crops. Government intervention has been confined to individual projects. Farmers sell directly to local traders who truck the produce into the major cities.

Marketing of cash crops is also handled by private traders. Producers have received low prices from marketers, and the Government has attempted to improve returns to export crop producers by regulating profit margins. For example, coffee producers received about 33 percent of the f.o.b. price in 1970, whereas farmers currently receive about 50 percent of the f.o.b. price.

Despite attempts to improve returns to cash crop producers, farmgate prices have changed in favor of food crops. Export taxes and oligopsonistic marketing have discouraged cash crop production, particularly sugar. Sugar prices are set at all levels of production and processing to maintain low retail prices. The low producer prices have encouraged farmers to switch to other more profitable crops such as corn, red beans, and tobacco.

The Government does not control retail prices of basic grains. Prices tend to be high compared to world levels, although it appears that retailers rather than producers have received the benefit of high prices. Lack of storage results in both seasonal price fluctuations and large regional price differentials.

The Government controls the retail price of sugar, flour, and cooking oil and earns significant revenue from taxes on these items. In fiscal year 1979/80 the effective tax rate on these three items was 15 percent, and taxes contributed 10 percent of total Government revenue.

Direct production and marketing controls have been very limited in Paraguay. Price policies have been almost impossible to implement because of limited financial resources, vulnerability of the economy to price movements in Argentina and Brazil, and the difficulty of controlling trade across borders. The Government does maintain minimum reference prices for cotton, sugarcane, and soybeans, but for all practical purposes, commodities are free from Government controls.

Wheat is the one commodity that the Government has encouraged through direct price intervention. The Government initiated the National Wheat Program in the mid-sixties to achieve self-sufficiency. Producer prices were set above the world price and in 1981 equalled 153 percent of the world price. A special financial facility was created to provide immediate payment for delivery of wheat. Despite these incentives, Paraguay does not have a comparative advantage in wheat; production and yields have been declining.

Crop production has fared better than livestock production in recent years, but export crop production, particularly that of cotton and soybeans, has increased at a faster rate than food crop production. The share of export crops to total value added in agriculture increased from 14 percent in 1972 to 28 percent in 1979, while the share of domestic crops decreased from 50 to 38 percent during the same time. Much of this shift is explained by high world prices for cotton and soybeans.

Price controls are maintained on only a few items. Official policy proscribes passing along increased costs to the consumer. Beef prices are kept low to encourage consumption. Food prices are affected by the supply of domestic foodstuffs as well as the rate of inflation in neighboring countries. Food prices have recently tended to increase faster than the general price level.

Trade controls and exchange rates. Most governments control imports of cereals through state trade agencies or licensing requirements. Two agencies in Peru have a monopoly over imports of most food items: wheat, potatoes, fats and oils, rice, milk, soybeans, and sugar. Private traders were allowed to import corn and sorghum in mid-1981, but were required to pay a 40-percent duty. State-run agencies in Jamaica have been monopoly importers of basic foods since 1978, although the Government is attempting to reduce the role of the marketing agencies in trade. Guatemala's grain marketing agency also has a monopoly over grain imports. All food imports require a license. The Dominican Republic maintains a monopoly over imports of wheat and rice and requires an import license for other grains. Brazil requires an import license for wheat and corn and Paraguay for wheat and rice.

Other exchange and trade controls have been used to regulate food imports. These restrictions have often followed in the wake of an appreciating exchange rate to counter foreign exchange shortages. Controls were instituted in Jamaica (1977) and Haiti (1980) following several years in which the exchange rate appreciated (table 12). Foreign exchange in Haiti is allocated according to a list of Government priorities: petroleum, wheat, oilseeds, sugar, and rice. Paraguay, Jamaica, and the Dominican Republic have maintained dual exchange rates at different times that have resulted in implicit subsidies to food imports as well as discouraging exports. Inflationary pressures led Brazil to reduce many export incentives—tax credits, credit subsidies, and others—in late 1979, but these changes were followed by a large devaluation to lower the price of exports abroad.

Most countries maintain export controls on some food and agricultural products. Jamaica, Guatemala, Dominican Republic, and Brazil require export licenses or prohibit the export of certain food items. The restrictions are designed to maintain adequate domestic supplies at reasonable prices.

The Latin American countries, with the exception of Brazil and Jamaica, receive a substantial share of government revenue from taxes on international trade (table 10). The smaller share for Brazil and Jamaica is consistent with their higher per capita GNP. Export taxes are particularly important for Guatemala, Dominican Republic, Haiti, and Peru, and are generally higher than for most of the African countries. Export taxes in Peru have been increasing as a result of administrative changes in the rate structure. Export taxes

have fluctuated considerably in Dominican Republic and Guatemala, reflecting their reliance on agricultural exports. High export taxes in Haiti and Dominican Republic have acted as a disincentive to production.

Subsidized credit and inputs. Government supported credit programs are more predominant in Latin American than in African and Asian countries, whereas subsidized inputs have been used less frequently. The new governments in Peru and Jamaica emphasize credit to small farmers to improve productivity through higher input use. Subsidized credit has been an important component of Brazil's agricultural policy. Credit has been provided at low, or even negative, interest rates for crop financing, investment, and fertilizer purchases. However, Brazilian policy changes in late 1980 and early 1981 reduced the subsidy in agricultural credit and increased the role of commercial banks in providing rural credit. Credit from public institutions also has been an important policy tool in Paraguay, but private banks have played only a minor role in agricultural finance.

Guatemala and Paraguay have operated land settlement and rural development programs to develop unutilized land. The governments have provided technical assistance, transportation, and other services to farmers. Guatemala's research program has focused on improving seed and developing high-yielding varieties for basic staples. Guatemala subsidized the cost of fertilizer in 1974 when prices rose sharply, but removed the subsidy after prices fell.

Peru and the Dominican Republic have recently emphasized better research and extension services. Peru has also instituted new tax incentives to encourage investment, particularly in the undeveloped jungle areas. Government support services in Haiti have been very weak, especially field services. Input use is low and is reflected in low yields for most crops.

Constraints to implementation. Each country has faced a domestic budget constraint in implementing pricing and credit policies. Marketing boards in Peru, Dominican Republic, Jamaica, Guatemala, and Haiti have sold food grains and other staples at subsidized prices, resulting in occasional deficits that have been financed by government credit. For example, food subsidies in Peru in 1980 were $300 million, about 8 percent of current expenditure. Jamaican subsidies on basic consumer items, of which food is the largest component, equalled about 11 percent of Government revenue to 1977. Budgetary constraints forced the Government to reduce these subsidies in 1981 to $22

million, or 2.5 percent of Government expenditure. In Haiti, the state-owned flour mill has lost money since 1978 and has been forced to borrow from the domestic banking system to cover both costs of operations and wheat imports. Brazil's subsidized credit and other direct subsidies have contributed to inflationary pressures in the country and are being reduced. Subsidized credit programs for agriculture equalled 6 percent of GDP in 1980, and other direct subsidies to wheat, soybean, and sugar producers equalled 2 percent of GDP.

Cereal imports have not represented a large share of export earnings for most Latin American countries, despite the large share of cereal imports in cereal consumption. Haiti is the major exception, where cereal imports have equalled almost 25 percent of export earnings, although concessional imports have represented a substantial share of cereal imports (table 12). In the Dominican Republic, Jamaica, and Peru, cereal imports have occasionally reached 10 percent or more of export earnings. However, the relative share of food aid in cereal imports has been growing in Jamaica and the Dominican Republic since 1978. Food aid has occasionally been large relative to cereal imports in Paraguay, although the total quantities are small.

Summary. Government intervention in the food economy in Latin America has been extensive in Peru, Dominican Republic, Brazil, Jamaica, and Guatemala, primarily for protecting consumer welfare through adequate supplies and stable prices. Intervention in Peru and Jamaica flowed from a strong emphasis on redistributing income and achieving social equity. Policy instruments such as food subsidies and government regulation of cereal imports have been used to maintain stable prices and supplies in Dominican Republic, Peru, Jamaica, Guatemala, and Brazil. Retail prices, especially for wheat and rice, have not kept pace with inflation, and government subsidies for consumers have been substantial. Since each of these countries, except Jamaica, states consumer welfare as a policy objective, policy instruments have generally been consistent with this objective.

Although most Latin American governments set some sort of producer price for the basic cereals and staples, government procurement of cereals through marketing boards is not as important as in Africa or Asia. Producer prices for some commodities have been below world market prices in Peru (rice and corn), Dominican Republic, Guatemala (wheat and rice), and Jamaica. Food production has lagged in Peru, Jamaica, and Dominican Republic.

Brazil and Paraguay have tried to encourage wheat production by setting producer prices above world levels and maintaining a government monopoly over procurement. Efforts to achieve self-sufficiency in wheat have not been successful, partly due to climatic factors. Brazil and Paraguay have been successful in implementing policies to expand agricultural exports that have enhanced producer income and increased foreign exchange earnings.

Overvalued exchange and other policies that encourage food imports have hurt producers of export crops in Haiti, Jamaica, Dominican Republic, and Peru. Haiti faces the most severe physical constraints of any country, but the two stated objectives of producer welfare and self-sufficiency are not being pursued. Haiti has taxed food consumption to earn Government revenues. Peru and Jamaica, despite a poor record in food production and a heavy reliance on cereal imports, have recently elected new governments committed to redressing the current poor food situation.

Case Studies of Food Policies

We review Kenya, Tanzania, and Senegal in this section to provide additional insights into: (1) the extent to which announced objectives actually serve as a guide to the use of policy instruments; (2) the extent to which the structure of demand and supply of selected food crops in a country affects, in the cases of Kenya and Tanzania, the government's intervention strategy over 10 to 15 years; (3) whether annual contingencies, such as weather, foreign exchange shortages, and other unpredictable factors, affect the government's choice of policy instruments on a year-to-year basis; and, more importantly (4) the effect of intervention on the performance of the agricultural sector for selected crops.

In the case of (4), we explore the degree to which these governments actually attained their objectives and estimate the level of tax or subsidy on domestic and foreign markets implied by intervention. We estimate how the agricultural sectors of Kenya and Tanzania would have performed if these governments had followed a free trade policy.

Key policy instruments in Kenya and Tanzania are the announcement of producer and consumer prices and, then, the manipulation of imports and stocks so that markets clear at approximately the announced prices. Key policy instruments in Senegal include the control of exports of peanuts and imports of food grains. The Government also attempts to set domestic prices for food grains, but this control appears less effective than in the case of the other two countries due to the operation of parallel markets.

All three governments select and implement policies in a manner generally consistent with their announced objective of food self-sufficiency, but with an urban bias. Senegal appears to face a somewhat more perplexing policy choice than do Kenya and Tanzania, however, because its objective of food grain self-sufficiency directly competes with another objective of increasing peanut production for export to increase foreign exchange earnings.

Kenya and Tanzania responded to annual contingencies by adjustments in food grain imports and stocks. When foreign exchange was below long-term trend, these countries responded by decreasing imports and either drawing on stocks or increasing announced prices depending on whether stocks were above or below long-term trend. Senegal's choice of rice and wheat import levels was responsive to world market rice and wheat prices, Government revenues, and Government-held stocks.

The structure of domestic demand and supply for the commodities studied did affect intervention strategies in the long run. For instance, Kenya and Tanzania taxed those commodities for which they have a comparative advantage to produce and subsidized the production of wheat which could be obtained more cheaply from the world market. The effect of intervention on performance is not as clear in the case of Senegal.

Kenya

This case study determines the policy objectives of the Government of Kenya, describes the specific interventions designed to meet these objectives, and discusses some consequences of these interventions. This discussion flows from the formulation and estimation of an econometric commodity model of the Kenya food grain sector that comprises, in addition to the usual demand and supply equations, equations describing the Government's behavior. Commodities covered are maize, wheat, and rice. The analysis is based on data for the period from 1964 to 1979.[12]

Domestic self-sufficiency in food grains is a declared objective of the Government of Kenya. This objective permeates development plans, agricultural sector strategies, and public discussions of food price policy. A Food and Agriculture Organization of the United Nations (FAO)

report concisely states: "The main policy objective of the Kenya Government is to achieve self-sufficiency in grain production with any excess exported without loss to the Government" (15). Other particularly important objectives are the stabilization of domestic prices of food grains and the welfare protection of consumers by maintaining prices lower than those of the world level. The approach taken here is to infer from the analysis of the empirical data what the actual Government objectives appear to be. This case study draws heavily on reference (19).

Background

About 80 percent of Kenya's population of 16 million (1980) lives in rural areas. Agriculture dominates the economy, accounting for roughly 30 percent of GDP and 60 percent of merchandise exports. Cereals, forming the major portion of the average Kenyan's diet, accounted for 57 percent of calories consumed between 1972 and 1974 (17). Maize is the staple grain, alone accounting for 44 percent of total calories consumed and 77 percent of calories consumed in the form of grain. Roughly 80 percent of production occurs on small farms of fewer than 8 hectares. Wheat is the next most important grain, accounting for 8 percent of calories consumed in the form of grain. Far behind maize and wheat is rice, accounting for only 1.2 percent of calories consumed in the form of grain. Like wheat, rice is consumed primarily in urban areas.

Kenya was a small net exporter of the three food grains between 1964 and 1978; domestic production averaged about 9 percent more than domestic consumption. But this average picture, hiding dramatic year-to-year fluctuations in international trade, also masks some significant shifts in the composition of trade, with net exports of maize generally increasing and net exports of wheat declining. While population was growing by 3.5 percent per annum, and real GDP by 6.4 percent, domestic consumption of maize was growing by only 2.0 percent, consumption of wheat by 7.3 percent, and consumption of rice by 11.7 percent. This suggests that the income elasticity of demand for wheat and rice is large and positive, while that for maize is negative.

Kenya inherited a system of Government controls over the marketing of food grains from the colonial period. The relevant marketing board is the National Cereals and Produce Board (NCPB), formed by a merger of the Maize and Produce Board and the Wheat Board in 1979. It maintains a statutory monopoly over the marketing of grains, including

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[12]For discussion of recent weather disturbances that appear to have induced policy changes, see the previous section.

imports and exports, that enter national markets. Grains that cross the boundaries of the administrative district in which they are grown are considered part of the national market. At least once a year, but sometimes more frequently, the Government announces a new set of domestic producer and consumer prices. Producer prices are now uniform throughout the country, while consumer prices include an element of transportation costs.

The NCPB guarantees prices at the producer level; the Price Control Department in the Ministry of Finance enforces prices at the consumer level. The NCPB also holds stocks of grain in order to maintain a regular flow of supplies into consumption and to meet production shortfalls. The board is further required by law to maintain a strategic reserve of maize to meet emergency situations. NCPB enforces domestic price controls by making necessary adjustments in its own stocks or in international trade in order to equilibrate demand and supply at the set prices.

The Analytical Model

The essential dynamics of the model arise from Government policy interventions (1). At the beginning of each time period, the Government announces a net set of producer and consumer prices that prevail throughout the entire period. Domestic producers and consumers respond to these prices. The Government then makes the necessary accommodating adjustments in it own stocks or in international trade in order to clear domestic markets at the ruling prices.

While Government interventions are exogenous to producers and consumers, they are endogenous to the model and influenced in a systematic way by the state of the world as viewed by the Government. This state of the world includes world prices, Government-held stocks, foreign exchange reserves inherited from previous periods, P.L. 480 imports, and unanticipated supply and demand disturbances as each year unfolds, all of which are exogenous variables to the Government.

The model's supply and demand equations and the social accounting identity are conventional. The supply equation is a Nerlove partial adjustment model. The supply shifters are the producer price of export crops (coffee and tea), PPE_t, and a time trend, T, as a proxy for technological change (see app. table 1 for definitions of variables). Demand is a function of prices, CP_t/CPI_t, and private consumption expenditure, Y_t. All nominal variables are deflated by the Consumer Price Index in the demand equation and by the producer price of fertilizer (as an index of the cost of production) in the supply equation.

In addition, there are the Government or policy instrument equations. They are constructed first from possible long-term Government objectives underlying its interventions in food grain markets, and second from short-term constraints that impinge on the immediate achievement of long-term goals.

As a first step toward a model of Government behavior, we postulate that the Government has a longrun target producer price for each food grain. From previous arguments, it seems reasonable to represent this as a function of the domestic autarky or self-sufficiency price, SSP_t, and the world price, WP_t. This formulation allows both the autarky price and the world price to influence the longrun target producer price PP_t, so that the latter may vary from year to year. We further postulate that the Government has a longrun target consumer price, CP_t, in relation to the target producer price. Next, the Government holds stocks to maintain a regular flow of supplies to consumption and to meet production shortfalls at the ruling prices. Therefore, we postulate that the Government has a longrun target level of carryover stocks. This target will bear some relationship to the magnitude of random disturbances in the demand and supply curves. Finally, because the Government is the only holder of carryover stocks in this model, the Government's longrun pricing and stockholding decisions imply a longrun target level of imports (or exports, as the case may be).

The model contains short-term constraints on Government behavior. If there were no such constraints, the Government could be presumed to simply set prices, stocks, and net imports at the longrun target levels. These Government variables will diverge from the longrun targets because of short-term constraints.

The model incorporates four constraints. First, Government-held stocks inherited from the previous time period may be historically low and below the longrun objective. In this case, the Government may desire to build stocks in the present time period either by increasing the producer price, the consumer price, or net imports above the longrun target level. Second, the Government may face a foreign exchange constraint. In this case, the Government may desire to save foreign exchange by reducing imports of food grains below the longrun target level. Third, the Government may receive

some foreign assistance in kind, such as P.L. 480 imports, which represents a below-market price source of the commodity. This may induce the Government to lower domestic consumer prices and, ceteris paribus, bring about a higher level of total imports than would otherwise have been the case. Fourth, it is impossible to anticipate disturbances in the supply and demand equations as each year unfolds. The Government accommodates these disturbances, not by modifying prices because these are already fixed for each time period, but by changing the level of stocks or by engaging in international trade.

The model equations are provided in appendix table 2.

Results of the Analysis

The model results for Kenya are shown in appendix tables 3 through 7.

Government-announced producer prices are in the longrun primarily a function of the world price in the case of maize (app. table 5), both the world and autarky prices in the case of wheat (app. table 6), and only the autarky price in the case of rice (the estimated coefficient of the world price in app. table 7 being negative in this case). Hence, both prices appear to play a role. But the more important the commodity is to domestic consumption of food grains and the more significant the commodity is in consumption, the greater will be both the social cost to the country and the direct cost to the Government treasury of maintaining domestic prices that diverge from world prices.

Estimated elasticity of net imports to the expected world price is −9.717 for maize (app. table 5) and −9.45 for wheat (app. table 6). This says that small changes in world prices can transform Kenya from a net importer to a net exporter, or vice versa, which is reasonable because Kenya's external trade in both grains has been very thin. The responses of net imports and Government-held stocks to actual world prices in the current period are inelastic for all three grains. These findings are consistent with the importance attached to domestic price stability in the short run whatever the cost to the Government.

Longrun consumer prices of all three grains have moved in tandem with producer prices. But, the margin between the two prices has been increasing significantly over time in the case of maize and decreasing significantly over time in the case of wheat and rice. Maize is consumed throughout Kenya while wheat and rice are consumed

primarily in urban areas; these divergent price margin patterns suggest that the Government has been subsidizing urban consumers more and more through the consumer-producer price margin, either as a deliberate act of policy or in response to urban political pressures.

When stocks are below trend, the Government builds them up in the next two periods. Maize and wheat stocks are accumulated primarily by increasing imports rather than by increasing domestic prices. There is also a significant net import response to foreign exchange reserves in all three models. When reserves are below trend, the Government imports less (or exports more) in future periods by increasing producer prices in the case of maize, both producer and consumer prices in the case of wheat, and consumer prices in the case of rice.

The Government's response to (positive) unanticipated demand and supply disturbances is to import equally more grain (53 percent of the response) and to reduce stocks (47 percent) in the case of maize, and only to reduce stocks in the case of wheat. This seemingly different behavior probably arises because Government-held stocks of wheat have historically been much larger relative to total consumption (about 75 percent) than stocks of maize (about 20 percent). Therefore, in the case of wheat, it has been possible to accommodate excess demand stocks at the prevailing prices solely by reducing Government-held stocks.

Conclusions

The margin between consumer and producer prices maintained by the Government has been very large for all three grains, although not very different from margins maintained on the average throughout several other East African countries (app. table 8). Margins are larger for rice and wheat than for maize since more of the produce is lost in processing.

In view of these large margins, either the NCPB provides an inefficient service or the cost of providing marketing services in Kenya is very high. Per-ton transport costs are often very high in most African countries because of poor infrastructure and the high mileage relative to the volume of trade. Still, consumers have probably not been subsidized on the average through the margin. It seems more likely that they have been taxed compared to the margin that might have prevailed under a freer marketing system.

The consumer-producer price margin has been increasing significantly for maize, but declining for wheat and rice,

suggesting that Government policy increasingly favored urban consumers during 1964-78.

At the official exchange rate, the average rate of taxation on export crops in relation to the world price has been about 5 percent in Kenya, which is much lower than in most African countries (6). The main form of taxation on the export sector is the overvalued exchange rate, estimated to be about 25 percent (27).

Maize production has been taxed in relation to the world price on average by 13 percent. Wheat production has been subsidized by 8 percent, and rice production taxed by 35 percent. The rate of taxation in all cases has been increasing over time, but significantly so only in the case of maize. The rate of subsidy on wheat production consequently dropped to zero in about 1977. Because the rate of taxation on export crops has been roughly constant over the time period, food grains have been taxed more and more relative to export crops.

It may seem inconsistent to tax production of two food grains and subsidize the third, but this inconsistency diminishes when viewed in terms of the Government's declared self-sufficiency objective. A degree of self-sufficiency in food grain production has genuinely been a major objective. While the rate of taxation on the three crops varies considerably, the degree of self-sufficiency maintained—given the rate of taxation on export crops and the consumer-producer price margins maintained by the Government—varies much less, from 91 percent in the case of rice to 107 percent for wheat and 115 percent for maize. Rice production has been taxed the most because Kenya is a low-cost producer.

Overall results paint a consistent picture. Government interventions in food grain markets are biased to urban areas. The NCPB provides more food security to urban consumers than to rural farmers, stocks of wheat being higher in relation to total domestic consumption than stocks of maize.[13] Furthermore, Government-maintained margins between producer and consumer prices have been uniformly decreasing in the case of wheat and rice, but increasing in the case of maize.

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[13]See Uma Lele and Wilfred Candler, "Food Security: Some East African Consideration," in (57). They make the same point that national "food security" policies in East Africa represent food security for the urban areas, not for the country as a whole.

The Government of Kenya taxes its agricultural sector, both export crops and food grains, on net in relation to the world price, especially at a realistic exchange rate. Within this general policy, specific government policy with regard to food grains seeks to maintain a degree of self-sufficiency in food grain production, which therefore limits the degree of taxation that the Government can consistently impose on the food grain sector. Given the rate of taxation of export crops and the margins maintained between consumer and producer prices of food grains, the taxation observed on food grain production has been close to the maximum possible consistent with the self-sufficiency objective. Government interventions in domestic food grain markets, designed in the colonial period to protect the interests of producers, are now being used primarily to benefit urban consumers.

Kenya has been a low-cost producer of maize and rice in relation to the world price and a high-cost producer of wheat. Under free trade, the country would have exported maize in every year, exported rice in every year but 1977, and imported wheat in every year but 1975 and 1976. By taxing maize and rice production, Kenya became a less significant exporter of maize and a net importer of rice. By subsidizing wheat production, Kenya became a net exporter of wheat. On average over the 15-year period, the Government's policy of self-sufficiency in food grain production reduced Kenya's participation in international trade from net exports of 499,000 to 70,500 metric tons of maize; from net imports of 45,100 to net exports of 7,100 metric tons of wheat; and from net exports of 8,100 to net imports of 1,400 metric tons of rice. The changes would be even larger if world prices were converted at an exchange rate more realistic than the official rate.

Government food grain policy has clearly involved a cost in terms of commodities. It has also caused a once-and-for-all real income loss according to the static theory of comparative advantage. Even so, Government interventions in domestic food grain markets are entrenched and show little sign of changing. Arising from the political process, these interventions presumably bring political benefits of a political nature to the Government that cannot be measured in dollars and cents. While the Government's food grain policy has not been without cost, it has probably contributed sucessfully to domestic political stability, which in turn has contributed to the country's relatively rapid economic development. The policy is urban-biased, for this is where political power disproportionately resides. But the rate of taxation on the agricultural sector has not been as

excessive as in many African countries, and the Government's investment in agriculture has been sufficiently large to maintain relative low-cost production of major staples.

Tanzania

The objective of this case study is to gain insights into the involvement in agriculture by the Government of Tanzania and to measure the impact of this involvement on external trade in food grains.

Background

Approximately 90 percent of Tanzania's total population of about 17 million resides in rural areas, comprising about 2.3 million families and 8,000 villages. Agriculture dominates the Tanzanian economy, accounting for an average of 40 percent of GDP and an average of about 70 percent of merchandise exports. While GDP and GDP per capita grew at an annual average rate of 5 and 2.2 percent respectively during 1968-78, total agricultural production advanced at an annual average rate of only 1.9 percent. Agricultural production per capita actually decreased at an annual average rate of 0.9 percent. Main food crops are maize, cassava, sorghum, millet, and rice. Rural diets are dominated by cereals, roots, and tubers.

Annual maize production nearly equalled consumption during 1968-78, while wheat and rice imports were necessary to satisfy the annual excess demand. Annual growth in imports of these three grains ranged from 2.5 percent for wheat to about 8.2 percent for maize. Maize imports were particularly important during the 1973-75 drought.

Public intervention in economic activity is derived from Tanzania's objectives for social and economic development outlined in President Julius Nyerere's Arusha Declaration of 1967. Extensive public intervention has meant the control of commodity prices at both the farm and retail levels. Over 100 parastatal processing and retailing firms and crop authorities control marketing of most agricultural commodities from the farmgate to the retail store. Food prices are administered through various Government entities. The National Milling Corporation (NMC) purchases farm-level supplies of cereal crops. It is virtually the sole buyer of wheat. Marketing of export crops is the responsibility of the respective crop authorities (the cotton authority, tea authority, and coffee authority, for example). Retail markets for food are mostly nationalized, except for fruits and vegetables. Sales occur through Government-operated retail outlets.

Transportation of agricultural inputs and commodities is also controlled by the public ownership of transport facilities and equipment and through licensing of private vehicles. Tanzanian panterritorial pricing policy requires that official prices be applied in a uniform manner throughout the entire country, and/or that a single price be charged for an agricultural input without regard to location. Tanzania is now changing that policy. The Government's willingness to purchase and supply food grains from stocks or imports throughout the year at prevailing announced prices has led to substantial deficits on the accounts of many parastatal firms, particularly those of NMC (48).

Econometric Results

The model of Tanzanian Government intervention in food grain markets is structurally identical to that of Kenya (definitions of variables and equations in app. tables 1 and 2). The hypothesis is that Government intervenes to maintain its announced prices in the markets for maize, wheat, and rice. The Government has four longrun targets regarding each crop's producer price, consumer price, Government-held stocks, and net imports. Given announced prices, the Government expects its forecasts of consumption and production levels to clear markets through planned adjustments in stocks and imports. Various factors can disrupt these plans in the short run, however. These factors include foreign exchange shortages, world market prices, unanticipated supply and demand stocks, and, consequently, unanticipated stock shortages. Also, P.L. 480 imports are unlikely to be known in advance of the announcement of prices. These factors, or shortrun constraints on Government behavior, can cause actual announced prices, observed stocks, and imports to diverge in any given year from the longrun target level.

Viewing Government intervention in this manner gives rise to six equations in six endogenous variables for each of the crops, maize, wheat, and rice. Two of the six equations are demand and supply functions which characterize the behavior of the private sector. The remaining four equations explain the levels of Government-announced consumer and producer prices and levels of Government stock and imports.

Demand and supply equations. Results from fitting the per capita demand functions for maize, wheat, and rice appear in appendix table 9. Since the critical chi-square value for three degrees of freedom is 7.82, the restrictions imposed by the Slutsky conditions are not rejected at the 0.05 level of significance.

The demand functions fit the data remarkably well. All signs are correct except the cross-price effects between maize and rice, although they are not significantly different from zero in either case. All direct price and income expenditure effects are significant.

Both the direct price and expenditure effects are the largest for wheat followed by rice and maize, respectively. This ranking suggests that wheat is a prestige food grain relative to the other grains while rice is preferred relative to maize. The expenditure effect for maize is also large, suggesting that it is preferred to roots and tubers. As income increases, demand for wheat and rice increases relative to maize, or conversely, differential changes in income, say between rural and urban areas, will cause differential rates of growth in food grain demand. Tanzania is not, unfortunately, a low-cost producer of wheat. Hence, rising incomes, especially in urban areas, will likely increase the import demand for wheat.

Results from fitting the total and marketed production equation for maize, wheat, and rice to the data appear in appendix table 10. The equations provide a reasonably good fit to the data with significant direct-price effects and expected signs obtained in all cases.

In the case of the total production equations, results suggest fairly rapid adjustment in the quantities of maize and rice produced to price changes. Wheat, produced almost exclusively on Government farms, appears to respond more slowly than do rice and maize to price changes. The annual rate of growth in wheat production also lags behind that of the other crops, with rice showing the most rapid growth rate. Results also suggest that maize competes for resources used in the production of export crops; a 1-percent increase in the price index of export crops results in an average of about a 0.2-percent decrease in the production of maize. Results also suggest that maize competes for resources with both wheat and rice.

Also consistent with expectations are the relatively large direct price elasticities associated with the marketed production of maize and rice. Since the majority of maize and rice is produced on small farm plots, these results suggest that those plots yielding a surplus over household consumption needs, and perhaps sales in unofficial markets, are responsive to the relative terms of trade between food and export crops. Indeed, virtually no lag exists in their supply adjustment response to price changes from year to year. Also revealing is the virtually zero annual growth rate in

marketed production of maize and rice. Since marketed production corresponds to purchase by NMC, this result suggests either that the marketed surplus of maize and rice over farm household needs has stagnated or that marketed production has bypassed official channels.

Policy instruments. Elasticities calculated from the estimated Government behavioral equations are presented in appendix tables 11, 12, and 13. Results provide important insights into Government interventions: Government has intervened in the markets for maize, wheat, and rice by announcing prices and inducing markets to clear at these prices through adjustments in Government-held stocks and imports. The results also suggest that shortrun constraints caused deviations from longrun targets.

In the case of maize (app. table 11), the Government-announced producer price has been equally a function of the expected autarky and world prices. The estimated impact on net imports of expected world price implies that small changes in the world price can transform Tanzania from a net importer to a net exporter, or *vice versa*. When stocks of maize are low at the end of one period, the primary response of the Government is to import more in the next period to build up stock; the secondary response is to raise consumer prices. When foreign exchange reserves are low, the Government will generally reduce imports by increasing producer prices. But this response is not significant.

The Government's response to P.L. 480 imports is to lower consumer prices and to increase imports. In this instance, food aid creates demand; it does not simply substitute one-for-one with commercial imports. The Government's response to unanticipated positive demand and supply shocks is primarily to import (78 percent of the response) and secondarily to reduce stocks (22 percent). This is typical of a government that uses international trade as a buffer stock in order to moderate domestic price changes. The Government has not been able to use stocks alone to accommodate demand and supply shocks because the average level of stocks over the period (50,300 metric tons) has been less than the average demand and supply shocks (85,100 metric tons). Production has been very unstable from year to year.

In the case of wheat (app. table 12), the Government-announced producer price has been primarily a function

of the expected autarky price. When stocks of wheat are low, the Government builds up stocks equally by importing in the next period and by raising consumer prices. When foreign exchange reserves are low, the Government imports significantly less in the next period, primarily by increasing consumer prices and secondarily by increasing producer prices. Unlike the case of maize, the Government's response to P.L. 480 imports is insignificant. But similar to maize, the overwhelming response to unanticipated demand and supply shocks is to import more.

In the case of rice (app. table 13), the Government-announced producer price has been primarily a function of the autarky price. When stocks are low, the Government responds primarily by importing more in the next period and secondarily by increasing consumer and producer prices. When foreign exchange reserves are low, the Government imports less in the next period by reducing stocks and by increasing both consumer and producer prices. The response of total net imports to P.L. 480 imports is positive but insignificant from zero. Unlike the case of maize, P.L. 480 imports do not appear to create demand because the major response to such food aid is to build up domestic stocks. As in the case of both maize and wheat, the major resonse of the Government to unanticipated demand and supply shocks is to import more (79 percent of the response) and secondarily to reduce Government stocks (21 percent).

The models have succeeded in isolating four major constraints that impinge upon Government behavior: Government-held stocks, foreign exchange reserves, P.L. 480 imports, and unanticipated demand and supply shocks. Some of these responses are consistent for all three commodities. The general response to low levels of stocks is to import more in the next period; to foreign exchange reserves, to adjust domestic prices; and to unanticipated demand and supply shocks, to equilibrate domestic demand and supply by engaging in international trade. The only significant response to total net imports to P.L. 480 imports occurs in the maize model.

The models have succeeded in separating long-term Government pricing behavior from selected short-term constraints. In response to the underlying policy of the Government over the entire period in question, domestic consumer and producer prices have tended to move in tandem, although there has been some tendency to reduce the margin between consumer and producer prices in the case

of wheat and rice. The major determinant of domestic producer prices has been the expected autarky price. World prices have had a secondary influence. The more important the crop to domestic consumption, the more important has been the influence of world prices, since in this case deviations of domestic prices from world prices place a heavier burden on foreign exchange.

The Impact of Government Intervention

The next step is to obtain insights into whether the Government's intervention policies have been a tax or subsidy to the producers and consumers of these crops. Results appear in appendix table 14.

The first feature of Government policy that emerges from the table is that the margin between consumer and producer prices differs little from margins maintained on average in four other countries in East Africa.[14] Margins are larger for rice and wheat than for maize since more of the product is lost in processing (35 percent in the case of rice, 25 percent for wheat, and 10 percent for maize). NMC has been running a persistent deficit in recent years.[15] This deficit implies that the NMC is subsidizing the margin by not covering the cost of transport, milling, and other functions from retail sales.

The impact of longrun pricing policy on producer prices is shown in the bottom half of appendix table 14. Even at the official exchange rate, which is almost surely overvalued, the rate of taxation on producers of export crops has been large (about 32 percent over the period); the rate has been increasing. In 1977, the margin was estimated to be about 47 percent. Given a more realistic exchange rate for the Tanzanian shilling, this estimate would be even greater. Maize production has been taxed on average over the period by about 24 percent, once again at the official exchange rate; wheat production has been subsidized by about 15 percent; and rice production taxed by about 36 percent. However, in the cases of these grains, the rate of

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[14]One of the authors has estimated the equivalent consumer-producer price margins for four countries in East Africa—Kenya, Zambia, and Malawi in addition to Tanzania—as part of his Ph.D. research. The overall mean for the four countries comprises one country (Zambia) in which the margin is subsidized very heavily, another country (Malawi) in which it is taxed in order to generate development resources, and two countries (Kenya and Tanzania) where the situation is intermediate.

[15]At the end of 1980, the NMC had a bank overdraft of $US 350 million (at the official exchange rate), which represented 40 percent of all Bank of Tanzania loans (3, p. 5739).

taxation has been decreasing. If observed trends had continued, the rate of taxation on maize production would have dropped to zero in 1981.

These results clearly suggest that Government policies have subsidized the urban sector at the expense of a tax on the rural sector. Since wheat is grown on Government farms, the selling of wheat below cost is also a subsidy to urban consumers. Results discussed below suggest that the decline in taxation reflects the ever-tightening constraints on the Government's capacity to intervene in these markets because of rising production costs.

It may seem inconsistent to tax the production of two food grains and subsidize the third. But, this is not so inconsistent when viewed in terms of a self-sufficiency objective. Our empirical results provide strong evidence that a degree of self-sufficiency in food grain production is indeed a major Government objective. While the rate of taxation on the three crops varies considerably, the degree of self-sufficiency maintained varies much less, from 84 percent in the case of wheat to 95 percent in the case of maize. Rice production has been taxed the most because Tanzania is a low-cost producer in relation to the world price, and wheat production has been subsidized because Tanzania is a high-cost producer. We conclude that NMC has maintained producer prices. Therefore, the rate of taxation on production has been higher, the lower the cost of domestically producing the crop. The conclusion is that Government-announced producer prices have been influenced more by the autarky price than by the world price.

The final question to address is whether intervention has affected the production and price levels of these crops. Insights into this question are obtained by performing two simulations for each crop. The first simulation involved solving the estimated supply and demand functions as if the country followed a free world trade policy at official exchange rates. The second simulation involved solving the system of estimated equations based on the Government's pricing targets.

Simulations 1 and 2 in appendix table 15 suggest that Tanzania has been a low-cost producer of maize and rice in relation to the world price—the ratio, WP_t/SSP_t, has been greater than unity—and a high-cost producer of wheat. These results are hardly surprising considering that wheat is a temperate zone crop, while maize and rice are subtropical. However, the cost of producing all three crops has been increasing over time, and in the case of maize, Tanzania became an average cost producer of maize (with

WP_t/SSP_t = unity) roughly in 1976. Rising production costs for maize and rice imply that the Government is forced to reduce the level of taxation if it is to maintain or increase domestic supplies of these crops.

A comparison of simulation 1 with simulation 2 indicates that Government intervention did indeed have a significant impact on supply and price levels. If domestic prices had been at world market prices over the period, Tanzania would have been a net exporter of maize and rice and a net importer of wheat. In all three cases, net exports would have declined (or net imports increased) over time. Instead, by taxing maize and rice production, Tanzania became a net importer of both. By subsidizing wheat production, it became a less significant net importer of wheat. The picture does not change dramatically when the impact of government consumer prices is added. The Government's policy of self-sufficiency in food grain production has reduced Tanzania's participation in international trade from net exports of 126,300 metric tons to net imports of 47,900 metric tons in the case of maize; from net imports of 89,000 to 31,500 metric tons of wheat; and from net exports of 80,500 to net imports of 21,600 metric tons of rice. Policy has also reversed the maize trend from one of increasing net imports by 21,100 metric tons a year to one of decreasing net imports by 26,300 metric tons.

Conclusions

Government market intervention in Tanzania has subsidized the urban sector at the expense of the rural sector. Intervention has effectively divorced the domestic market for food grains from the international market, and this has had a significant impact on external trade in food grains. In Tanzania, within a general policy of import substitution/industrialization that has taxed on net the agricultural sector, specific government policy on food grains is one that seeks to maintain a degree of self-sufficiency in food grain production, and that therefore limits the degree of taxation that the Government can consistently impose on the food grain sector. External trade in food grains has been very unstable from year to year owing to the operation of short-term constraints and the Government's response to them. Over the long run, Tanzania is becoming a higher cost producer of all three food grains in relation to the world price. Therefore, in order to maintain its policy of self-sufficiency, Tanzania has lowered its taxes on food grains over time in relation to taxes on export crops.

Senegal

The Government of Senegal has relatively effective monopolies on the marketing of imported food grains, official (but somewhat less effective) control of the procurement and marketing of domestically produced food grains and peanuts, the imposition of producer and consumer prices for food grains and peanuts, and subsidies on farm inputs. Average per capita cereal consumption in Senegal is 210 kg/year (21). Of the five major food grains consumed, Senegal imports nearly 100 percent of its wheat, roughly 77 percent of its rice, about 6 percent of the millet and sorghum, and no maize (12). Of the domestic production of rice, millet, sorghum, and maize, the greatest share (as high as 99 percent of some grains in some years) is either consumed by the producers themselves or directly marketed by them on the parallel free market (12, 13).

Peanuts averaged 43.3 percent of Senegal's total exports by value from 1972 to 1977. Economically and politically dependent on revenues from peanut exports, the Government appears committed to maintaining them at high levels (12, 54).

The Government espouses a policy goal of greater food self-sufficiency. Imports averaged 34 percent of Senegal's total cereal consumption between 1973 and 1977. The Government pursues greater food self-sufficiency through investments and policies to expand rice production and by efforts to shift consumer demand from rice to other domestically produced grains, principally millet (12, 13).

The Government's twin goals, high peanut export levels and greater domestic food production, have led to a number of apparent policy conflicts. One problem is that of setting relative producer prices for peanuts and food grains to simultaneously stimulate increased production of both. Another is that of setting consumer prices for food grains to increase substitution of domestically produced grains for imports in consumption. These problems are complicated by cross-price and substitution effects both in producer supply response (that is, between peanuts and food grains) and in consumer demand (for imported rice and wheat versus domestically produced rice, millet, and sorghum).

Background

The Government-controlled, monopoly marketing system (comprising the Government's marketing board, ONCAD, the *Caisse de Prevoyance et Stabilisation des Prix,* and the cooperatives) has effectively taxed the agricultural sector by buying cheap and selling dear on the world market, whenever possible. At times, the system has also subsidized urban food grain consumption through its simultaneous ability to manipulate access to domestic production and imports.

In spite of the Government's *de jure* monopoly over the marketing of both peanuts and domestically produced food grains through ONCAD, it has not succeeded in prohibiting significant sales on the parallel markets. There are few estimates of the magnitude of such sales, however. Government prices apparently tend to serve as support prices for these markets. In representative millet producing households in three rural villages, the marketed surplus averaged 25 percent of total production in 1977 (23 percent in 1976), according to a survey by Ross (36). These households disposed of their surplus in a total of 173 sales of which only four were to ONCAD. The majority of sales, 77 percent, were to local stores or traders, and 21 percent of the sales were direct to neighbors or in local markets. Over a year, the mean sale price exceeded ONCAD's official price in every case, with margins ranging from 1 percent to 31 percent (including the cost of transport to the ONCAD buying station), according to Ross.

Another study found that official marketing accounted for only 65 to 75 percent of total estimated production of peanuts, with the rest going to illegal sales through The Gambia, home use, and seed stock (12). Producers are heavily involved in officially illegal, but *de facto* tolerated, private marketing of food grains. While much of the food production is subsistence, a sizable portion of it feeds the rural nonproducing and urban populations through private marketing. Some of the production moves across borders, especially to Mali and Mauritania.

An overvalued exchange rate on trade has an important impact on Senegalese agricultural exports and food grain imports. An overvalued currency generally taxes exports and subsidizes imports of a "small" country (one facing world prices for its traded goods). Such an exchange rate policy is in direct conflict with Senegal's principal, stated agricultural policy goals: reduced import dependence through increasing food grain self-suficiency and maximizing peanut export revenues. On the other hand, as a major world exporter of peanuts, Senegal may not be a "small" country in the strictest sense, even if it faces prices on its imports. It may be able to pass on part of its overvalued exchange rate to buyers of its exports rather than obliging its domestic producers to absorb it all.

Several problems complicate Senegal's exchange rate and price policy issues. First, its national currency, the CFA franc, is shared with 10 other African countries. Monetary policy for the West African CFA zone countries is directly influenced by a central banking authority. Since there is little intrazone trade and coordination of domestic economic policies, each country can experience a different level of over- or undervaluation *vis-a-vis* other world currencies. Second, because of parallel market systems for peanuts through The Gambia and for food grains both domestically and through The Gambia, Mali, Guinea, and Mauritania (each with their own national currencies), production and trade are influenced by more than just the CFA franc-based terms of trade and Senegal official prices. Finally, because of Government monopoly over legal peanut exports and apparent desire to set prices paid to peanut producers relative to world prices received so as to stabilize Government earnings, it is not immediately clear to what extent the overvalued exchange rate tax is borne by the producers and how much is absorbed by the Government.

The question of pursuit of apparent comparative advantage (roughly peanut export/food grain imports) versus diversification (for economic stability or food security) is fundamental to Senegalese agricultural policy. Much of this analysis has focused on the central issue of optimal allocation of resources between peanut and food grain production. Most studies approach this issue from a relatively narrow comparative advantage point of view, ignoring the fundamental political, economic, and historical context from which such policies are derived. In its 1974 country study of Senegal, the World Bank argued that, in the face of marked fluctuations in world peanut prices, Senegal's agricultural strategy should focus on encouraging greater diversification (54).

A University of Michigan survey of marketing, price policy, and storage of food grains noted several important policy conflicts that derived from the Senegalese Government's simultaneous pursuit of greater food self-sufficiency and high levels of peanut exports. It concluded that any shift away from the comparative advantage position of reliance on peanut exports and food grain imports could be achieved only at the cost of a decline in national income (12).

A Stanford University Food Research Institute and West African Rice Development Association Study focused on a potential for greater food self-sufficiency through increased rice production (30). It found that, given Senegal's

high costs of production and historically wide year-to-year variation in yields (due principally to weather), there is no economic justification for the Government's policy of import substitution for rice.

Results of an Econometric Model for Rice

Rice production and consumption are major preoccupations of Senegalese food and agricultural policy. The Government has long intervened in domestic rice production and has focused on influencing the producer price, subsidizing inputs, and investing in infrastructure, research, and extension. However, despite the increased emphasis in policy statements on rice self-sufficiency in the seventies following the Sahel drought, the official producer price of rice was generally permitted to decline relative to peanuts and cotton, the major nonfood crops. The real producer price of rice (deflated by the consumer price index) fell throughout the last two decades.

An econometric model of the rice sector of the agricultural economy was developed for this report to investigate the impacts of certain Government agricultural and food policies. The model is divided into three sections: production, consumption, and imports.

The major source of these variations in yields over time appears to be annual fluctuations in rainfall. Separate regression equations were developed for this report for changes in cultivated rice areas and average rice yields in order to segregate the influences of government interventions on rice production from other exogenous events (that is, weather). Year-to-year fluctuations in rice yields were one of the principal arguments against increased reliance on domestic rice production to improve the country's overall food security situation, according to Craven and Tuluy (13).

The amount of land devoted to rice each year was strongly influenced by the real producer price of rice, according to our model. At the margin, a 1-percent increase (decrease) in the real producer price resulted in a nearly 3-percent increase (decrease) in rice area. Thus, if the Government should choose to reverse the steady decline in the real producer price of rice, a significant increase in the amount of land planted in rice would be expected, other things being equal. However, the supply of land suitable for expansion of rice production is not unlimited. In particular, we found that changes in rice area were negatively correlated with the amount of land in peanuts.

Rice yields were strongly influenced by rainfall, according to the model. The ratio of fertilizer prices to the producer price of rice proved to be an important determinant of yields; the lower the price of fertilizer (subsidized by the Government) relative to the rice price, the higher the yield. The amount of rice area planted in a given year positively influences the rice yield that year. This finding indicates that increases in rice area have tended to involve better quality land.

The model also explained changes in total national rice consumption over time. Consumption was measured as apparent disappearance (milled domestic production from the last harvest plus imports minus changes in rice stocks). Senegalese consumers respond strongly to the consumer price of rice relative to the urban food price index. When rice is relatively cheap compared to an index of all food prices, consumers increase consumption of rice. Senegalese rice consumers varied their consumption as their incomes varied (per capita gross domestic product). These points establish the economic responsiveness of consumers, despite observations by some researchers that rice, at least in urban diets, appeared inflexible with respect to economic variables (30)

For Senegal, as for much of West Africa, increased rice consumption has been driven up by the food consumption habits of rapidly growing urban populations, according to some analysts (14). This study, however, found a significant negative relationship between the increasing urban population in Senegal and total national rice consumption. Total rice consumption, though, has been increasing. This finding indicates changing rural diets and replacement of semisubsistence food farming (principally millet and sorghum) with cash crop production. This trend results in increased dependence of rural populations on purchased food grains.

The import model assumed that the Government, as sole rice importing agent, bases its decisions to import rice on the world price of rice, its own ability to pay, perceived consumer demand, and the general availability of food within the country.

The Government has one important alternative to rice when food imports are required: wheat for bread, noodles, and couscous. Many developing countries choose between rice and wheat, based on their relative prices, when meeting food import needs. The model used here found that the ratio of the world price of rice to the world price of wheat was an important determinant of rice imports. The model showed a significant, positive relationship between one year's gross domestic product and the following year's rice imports. In other words, higher national income generally leads to higher rice imports.

The relationship between rice imports and overall food availability is somewhat mixed. The model clearly shows the Government's awareness and concern regarding rice stocks on hand. The amount of rice stocks carried into each year negatively affected rice imports; low stock levels were met with increased imports, and vice versa. No significant relationship was found between concessional food aid shipments and rice imports, indicating that such food aid apparently does not replace or reduce significantly the need for food imports.

Conclusions

Relative prices have clearly played an important role in determining the levels of rice production in Senegal. Farmers responded to both relative crop prices in determining which crops to plant and to input prices in increasing yields. The other side of this coin, however, is the demonstration that no important crop can be analyzed in isolation from the complex interactions between cash cropping and food cropping. Changes in the relative profitability of crops appear to have important consequences for the overall crop production mix, with the most apparent tradeoffs being peanut vs. food grain production and, within food grain production, between production for home consumption and production for the market.

Price responsiveness of consumers has also been established, with similar conclusions vis-a-vis the potential and requirements for effective, consumer-oriented price policy. From a narrow point of view, an effective means of reducing dependence on rice imports might be to raise consumer rice prices (for example, by means of a variable levy on imports) with a consequent shift in consumer demand to other food grains. But to the extent that the market transmits this price increase back to farmers, the subsequent increase in production of rice and other food grains for which prices increase could have important negative consequences for national income if export crop revenues are reduced. It is unclear whether revenues from an import duty on rice could compensate for the decline in peanut export earnings.

Another issue is food consumption patterns in rural and urban households. Urban rice consumption is apparently not entirely the source of growth in rice demand it was once

thought to be. Increases in rural rice consumption are also evidently important. Thus, increased economic development of rural Senegal may have important consequences for food grain markets. Higher rural incomes, especially those from cash crop production, will lead to greater demand for food grains.

The ultimate competitiveness of Senegalese rice production versus Asian imports will lie both in events in food grain markets external to Senegal and in the rate of reduction of production costs domestically through technical change. International price risk stengthens the case for increased Senegalese food grain self-sufficiency (24). World rice prices have been historically subject to greater uncertainty than wheat prices due to the "thinness" of international trade in rice.[16] This relative instability is unlikely to soon diminish. Given the demonstrated responsiveness of Senegalese production to improved technology and its sensitivity to weather, continued investment in yield stabilizing and increasing technologies may be a better strategy than artificially high prices to reduce import dependence.

Findings and Implications

The findings and implications of this study may be grouped into those resulting from the survey and those resulting from the case studies.

Survey

Are policies employed by governments consistent with espoused objectives? They are not generally consistent in Africa, according to Bates (6). Our survey shows that the evidence is not conclusive, while our case studies show that the policies and objectives in those cases are consistent.

There are also questions over the importance of policy in achieving economic development. Economic analysis in general and this study in particular assume that policy makes a difference. This study does not prove or disprove that policy matters. The survey shows some relationship between policymaking and the agricultural and food situations in the various countries.

The relative roles played by policies and such other factors as good or bad infrastructure, favorable or unfavorable

[16]This thinness relates to the small percentage traded internationally relative to the total amount consumed, an average of 5 percent annually for rice from 1976 to 1980 compared to 18 percent for wheat over the same period.

weather, and technological know-how as major determinants of the aggregate agricultural situations in developing countries have not been conclusively demonstrated in this study. We assert, nevertheless, that economically sound policy is a necessary, although not sufficient, condition for development. Furthermore, domestic policy is one of the few variables that can be controlled by the governments of developing countries; thus, the importance of sound policymaking based on real facts emerges clearly. Policy analysis provides some valuable guidance to decisionmakers, but it is not the only important variable in making decisions.

The extent of government intervention in the food system in response to policy decisions is difficult to measure. Descriptions of institutions which have been developed to intervene in the market are not sufficiently quantitative to permit cross-country comparisons in many cases. Quantitative measures of price controls and other policy instruments, on the other hand, do not measure the ability of the government to effectively implement its policies. Thus, country comparisons tend to be partial and/or subjective.

The survey of food policies in 21 developing countries provided a regional overview of the structure and extent of government intervention in the food economy as observed through stated government objectives and several specific government policies—official producer and consumer prices, international trade restrictions, and credit and input subsidies.

Increasing producer welfare and achieving food self-sufficiency were the two objectives cited most often by governments. These objectives were followed by consumer welfare, stable prices, foreign exchange, and food security. The African countries emphasized self-sufficiency and producer welfare almost to the exclusion of other objectives. The Asian countries also cited these two objectives frequently, but had a broader range of objectives, including consumer welfare, stable prices, and food security. Producer welfare was also the most important objective for the Latin American countries. There was less emphasis on food self-sufficiency there than in the other two regions. Consumer welfare and enhancing (or saving) foreign exchange were the second most frequently espoused objectives in Latin America.

African countries apply production and marketing controls on the widest range of grains and other staples, although

even here there is great diversity. Tanzania maintains control on practically all commodities produced in the country. In contrast, Botswana controls only corn and sorghum. Asian countries focus production and marketing controls almost exclusively on wheat and rice. In Latin America, controls are distributed fairly evenly between wheat, rice, and corn.

Although Asian countries tend to emphasize controls on only wheat and rice, these commodities account for over 50 percent of daily per capita caloric intake for each country. Government controls in Africa cover a wider range of commodities than in Asia, but these commodities' share of daily consumption varies between 40 and 70 percent. The extent of government controls in Latin America is more variable than in the other two regions, ranging from less than 10 percent of consumption in Haiti and Paraguay to around 50 percent in the Dominican Republic, Guatemala, and Peru.

Each region employs many of the same types of instruments. But, the relative importance of or emphasis on a particular instrument varies by region. African governments have tended to establish government monopolies through parastatals responsible for procurement and marketing of cereals and distribution of inputs. Government agencies in Asia also have these functions, but they have especially emphasized large public food distribution programs designed to target low-income consumers. The Latin American region shows more variability by country. Brazil and Paraguay have subsidized credit to influence production, whereas the other countries, with the exception of Haiti, have relied primarily on official producer prices.

There are fewer differences between regions when comparing government controls on international trade. Practically all countries maintain government control over cereal imports, particularly wheat and rice, and to some extent corn. This partly reflects the growing importance of wheat and rice in urban diets in response to increasing incomes.

Practically all countries in each region have controlled retail prices of basic staples to maintain low and stable prices, particularly wheat and rice whether grown domestically or imported. The consumer subsidy thus appears to be the most pervasive policy instrument among these countries.

Several general conclusions can be drawn from this cross-regional comparison of objectives and policies. Government policy appears to be an important factor in the performance of the food and agricultural sector. The broad overview of this study does not allow us to make a direct link between policy and performance. But there are instances where governments have made definite policy adjustments and performance has changed accordingly; for example, Sri Lanka after 1977. Policies are not always effective. The effectiveness of a policy instrument is enhanced or constrained by other domestic and international factors such as physical infrastructure, weather, and international economic conditions. For example, attempts to increase wheat production in Brazil and Paraguay have not been as successful as envisioned because of climatic factors, even though producer prices have been maintained well above world prices.

Many countries are evaluating their policies and assessing the role and impact of government intervention. The role of government parastatals is being examined in Mali, Senegal, Sudan, Tanzania, and Kenya. The impact of low producer prices is being evaluated in many African and Asian countries. Food subsidies have been a primary instrument of government policy in many countries in all three regions, but are being evaluated, reduced, or eliminated in several countries; for example, Brazil, Morocco, Senegal, Sudan, India, Jamaica, Peru, and Sri Lanka. There is a general tendency in many countries toward providing greater returns to producers through higher prices and reducing the subsidy on consumers by raising food prices.

One of the greatest constraints governments in all regions have faced is the lack of domestic financial resources. This situation has prevailed in low-income countries like Mali as well as middle-income countries like Brazil. This domestic budget constraint has been a major factor in forcing many African and Asian countries to reevaluate extensive government intervention.

Policies have often had unintended consequences inconsistent with stated objectives. For example, efforts to improve food production in Sudan and Tanzania discriminated against export crop production and had adverse effects on the balance of payments situation.

Case Studies

While similarities exist among countries in stated food policy objectives, differences exist in the policies employed to attain objectives. Still further differences exist among countries in the extent to which policies and objectives affect prices. Furthermore, a positive correspondence does

not necessarily exist between the number of policy interventions employed and the economic impact on the economy. Kenya and Tanzania have common objectives and policies, but the distortion of commodity market prices is far greater in Tanzania than in Kenya.

The Kenya, Tanzania, and Senegal case studies included results of econometric analyses of the food grain sectors of these countries. Two major shortcomings of the case study analyses should be noted: (1) they are cast in a partial equilibrium context (that is, the income effects of policies in the agricultural other sectors are not considered), and (2) the distortions induced by generally overvalued exchange rates have been ignored.[17] Overvalued exchange rates discriminate against domestic agriculture and induce food imports. To the extent that our analyses suggest that agricultural production is being taxed, the income effect in agriculture is likely to decrease savings and investment and decrease the consumption of preferred foods (wheat, meat) relative to less preferred foods (cassava, maize), among other effects.

All three governments selected and implemented policies in a manner generally consistent with their announced objective of food self-sufficiency, but with an urban bias. The self-sufficiency objective for Kenya and Tanzania is perhaps better defined as an effort to insulate the domestic food grain market from the world market for food grains. However, Senegal appears to face a somewhat more perplexing problem because its objective of food grain self-sufficiency directly competes with the objective of increasing peanut production for export.

The degree to which the self-sufficiency objective was accomplished differed among the countries as did the choice of policies used to attain these objectives. Differences were also found in the "extent" of intervention; that is, the extent to which the price structure of the agricultural commodities was distorted relative to the price structure that would prevail without intervention.

The key policy instruments in Kenya and Tanzania are the announcement of producer and consumer prices, followed by the manipulation of imports and stocks so that markets clear at approximately the announced prices. Both countries subsidize production. The key policies in Senegal include the control of exports and imports of food grains and

peanuts. The Government also attempts to set domestic prices for food grains, but this control appears less effective than for the other two countries due to the operation of parallel markets.

The Senegalese Government's determination of rice import levels seems to consider the situations prevailing in both the domestic and foreign markets. The level of imports was found to be negatively related to the world price and positively related to the overall level of Government revenues. When rice stocks were low, the Government tended to import more rice to build up stocks. Furthermore, the Government seemed more sensitive to the cost of rice imports than to the cost of wheat imports. As the price of rice relative to the price of wheat increased, the Government imported less rice and more wheat.

The Kenya and Tanzania shortrun response to foreign exchange shortages was generally to reduce imports and to draw down stocks of maize, rice, and wheat. Tanzania's Government also appeared to adjust consumer and producer prices to save foreign exchange expenditures on imports. Unpredictable disturbances in supply and demand (such as weather and migration) were handled almost equally through adjustments in imports and stocks, but not through price changes. All three countries regulated wheat prices and imports to influence rice consumption and to encourage domestic markets for other food grains to clear at announced prices.

Domestic policies were marginally influenced by P.L. 480 shipments. P.L. 480 maize shipments to Tanzania induced the Government to lower the price of maize to consumers. Thus, P.L. 480 imports expanded consumption in this case. In virtually all other cases, P.L. 480 imports increased government stocks. No particular relationship between the level of commercial imports and P.L. 480 imports was observed.

The Senegalese Government subsidization of fertilizer prices increased rice yields. The demand for rice in Senegal appears to be growing faster in rural areas than in urban areas. In addition to the effect on rice consumption of rising rural incomes, this trend in rice consumption can be explained by an increasing substitution of wheat for rice in urban markets relative to rural markets.

Domestic demand and supply conditions (measured by what the domestic price for food grains would be in the

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[17]The reader is here referred to figure 1.

absence of intervention and world trade) in Kenya and Tanzania tended to have a more substantial effect on the levels at which prices were announced than did the world market prices for the commodities studied. However, the more important the crop to domestic consumption (rice in Kenya and maize in Tanzania), the more important was the world price in determining the level of announced prices. This situation suggests that these governments are aware that welfare costs of price distortions increase as the share of the domestic crop in the domestic market increases.

At official exchange rates, intervention policies in Kenya in 1964-78 amounted to a 13-percent tax on the production of maize, a 35-percent tax on the production of rice, and an 8-percent subsidy on the production of wheat, a crop for which Kenya is a high-cost producer relative to world prices. The implicit tax imposed on export crops is a mere 5 percent. However, all taxes and subsidies have a slight upward trend over the period studied.

Tanzanian intervention caused greater price distortions than in Kenya. The production of maize in Tanzania is taxed at 24 percent and rice at 36 percent, while wheat production is subsidized by about 15 percent. The production of export crops is taxed at 32 percent. Since production prices for these crops are reflected in related prices in both countries, production taxes (subsidies) amount to consumer subsidies (taxes). Marketing functions may also be subsidized so that the consumer subsidy is larger than indicated by producer prices.

Kenya, by taxing maize and rice production, has become a less significant exporter of maize and a net importer of rice. By subsidizing wheat, it became a net exporter of wheat. The Kenyan Government's policy of self-sufficiency in food grain production reduced the country's participation in international trade for those commodities for which it has a comparative advantage in production. Over a 15-year period, the average annual maize exports under nonintervention would have been approximately 480,000 tons per year as opposed to the observed average of 70,000 tons per year. Under nonintervention, an estimated 8,000 tons of rice would have been exported as opposed to the

observed average annual exports of 1,000 tons of rice. Wheat imports would have averaged an estimated 48,000 tons annually as opposed to the observed imports of 7,000 metric tons.

Effective intervention in Tanzania caused greater market distortions than in Kenya. Had Tanzania followed a free trade policy, at official exchange rates, it would have been a net exporter of maize and rice—183,000 tons of exports per year and 69,000 tons of exports per year respectively. Instead, Tanzania was a net importer averaging 47,000 tons per year and 21,000 tons per year of maize and rice, respectively. It would have imported an average 84,000 tons of wheat per year instead of the observed average of 31,000 tons per year.

Kenya and Tanzania, pursuing food grain self-sufficiency, have insulated the domestic market from the world market for food and grains. This insulation means that these countries have imposed an explicit tax on producers of those commodities that can be produced at lower costs than they could otherwise obtain from the world market. These taxes and subsidies have pushed resources out of the production of those crops for which the countries have a comparative advantage to produce, and pulled resources into those crops (wheat) for which the countries do not enjoy a comparative advantage to produce. These distortions have also reduced the scarce foreign reserves available to these countries.

Shortrun benefits have accrued to consumers in the form of lower consumer prices. In the partial equilibrium context of our analysis, the gain to consumers is more than offset by the loss to producers. Consumers also suffer in the long run because the lower income earned in the agricultural sector becomes a constraint on the sector's capacity (which comprises the majority of the population) to purchase goods and services. Furthermore, the slower growth in the agricultural sector implies that prices could eventually increase beyond levels that they would be under free trade, unless other sectors of the economy are sufficiently productive in earning foreign exchange to offset the foreign exchange costs of importing food.

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Appendix

Appendix table 1—Definition of variables

Variable	Definition
Quantities:	
QP_{it}	Total quantity produced of commodity i in time period t[1]
MPQ_{it}	Marketed production of commodity i in time period t
QD_{it}	Total quantity demanded of commodity i in time period t[1]
$PCQD_{it}$	Per capita quantity demanded of commodity i in time period t
M_{it}	Net imports of commodity i in time period t[1]
$PL480_t$	Concessional imports (food aid) of commodity i in time period t under the U.S. P.L. 480 program.
S_{it}	Government-held stocks of commodity i at the end of period t[1]
UD_{it}	Unanticipated demand for commodity i in period t
Prices:	
PP_{it}	Government-announced producer price for quantities of commodity i delivered to government marketing boards in period t[1]
CP_{it}	Government-controlled consumer price for commodity i in period t[1]
WP_{it}	World price of commodity i in period t, converted to units of domestic currency at the official exchange rate
SSP_{it}	Self-sufficiency price of commodity i in period t: a market-determined price at the producer level that would result under autarky
Other:	
PPF_t	Producer price of fertilizer for production occurring in period t
PPE_t	An index of the producer price of export crops in period t (1971=100)
CPI_t	Consumer price index in period t (1971=100)
WPI_t	World price index in period t: World Bank "c.i.f." index of U.S. dollar prices of manufactured exports to developing countries (1971=100)
Y_t	Private consumption expenditure in period t
PCY_t	Per capita private consumption expenditure in period t
POP_t	Total population in period t
FXF_t	Foreign exchange flows (exports plus foreign capital imports) in period t
FXR_t	Government-held foreign exchange reserves at the end of period t
T	Time trend (percent annual growth rate)

[1]Endogenous variable.

Appendix table 2—Complete model for a single commodity: Summary

Supply and demand equations:

Dependent variable	Constant	PP_t/PPF_t	CP_t/CPI_t	PPE_{t-1}/PPF_t	T	Y_t/CPI_t	QP_{t-1}	Error term
QP_t	b_o	b_1	—	$-b_4$	c	—	d	v_t
QD_t	a_o	—	a_1	—	—	e	—	u_t

Social accounting identity:

Dependent variable	QD_t	QP_t	S_t	S_{t-1}
M_t	QD_t	$-\ QP_t$	$+\ S_t$	$-\ S_{t-1}$

Policy instrument equations:

Dependent variable	Constant	$_t \cdot E_{t-2}SSP_t$	$_t \cdot E_{t-2}WP_{t-1}$	$_t \cdot WP_t$	$Y_t \cdot PP_t$	(S_t-S_{t-1})	(S_t-S_{t-2})	(FXR_t-FXR_{t-1})	(FXR_t-FXR_{t-2})	$PL480_t$	UD_t	Error term
$g_t \cdot PP_t$	n	a	B	—	—	—	v_2	—	f_2	—	—	w_{1t}
$h_t \cdot CP_t$	k	—	—	—	u	v_1	—	f_1	—	—	—	w_{2t}
(S_t-S_{t-1})	$\&$	—	—	-0	—	0_1	0_2	—	$-n_2$	z	$-¢$	w_{3t}
M_t	v	$(1-a)$	$-B$	-0	—	(0_1-v_1)	(0_2-v_2)	$-(n_1+f_1)$	$-(n_2+f_2)$	$(z+w)$	$(1-¢)$	$(w_{3t}-w_{1t}-w_{2t})$

— = Not in equation.

Note:

The variables, g_t and h_t, are scaling factors that convert nominal producer and consumer prices, respectively, into metric tons of grain in each year. They are defined as follows:

$$g_t = a_1 \cdot u/CPI_t + b_1/PPF_t, \quad \text{and} \quad h_t = a_1/CPI_t$$

They are also price deflators that depend on the level of prices in each year as represented by CPI_t and PPF_t.

Appendix table 3—Shortrun supply elasticities, Kenya, 1964-79

Crop production	Producer prices				Annual growth rate	Partial adjustment coefficient[1]	R²
	Maize	Wheat	Rice	Export crops			
	--------------------------------- Elasticity ---------------------------------						Statistic
Total:							
Maize	0.534 (3.75)	—	—	−0.348 (−4.41)	1.44 (2.33)	0.194 (1.07)	0.857
Wheat	−.980 (−3.95)	1.506 (5.67)	—	−.287 (−2.34)	1.21 (1.58)	.633 (5.16)	.874
Rice	—	—	0.484 (4.44)	−.331 (−4.40)	4.74 (2.87)	.645 (3.36)	.970
Marketed:							
Maize	1.149 (2.15)	—	—	−1.126 (−3.50)	10.04 (3.56)	1.213 (4.54)	.737

— = Not estimated.
[1]Coefficient of lagged dependent variable. In econometric terms, 1–d.
Notes:
1. Actual equations estimated were linear. Elasticities have been calculated at the mean. T-statistics are shown in parentheses below the elasticities.
2. Maize and wheat prices that appear as independent variables in the equations are Government-announced prices prior to planting in each year. Rice prices are actual prices received by producers (because announced prices were not available). Price of export crops is a Paasche index of actual prices paid to producers for coffee and tea, lagged 1-1/2 periods in the maize and rice equations and 1/2 period in the wheat equation.
3. Marketed production of maize and total production of wheat and rice correspond to purchases by the National Cereals and Produce Board in each year. Total and marketed maize production equations were estimated simultaneously, for improved efficiency, using Zellner's seemingly unrelated regression technique.

Appendix table 4—Per capita demand elasticities, Kenya, 1964-78

Crop	Producer prices			Private consumption expenditure	Expenditure proportion	R²
	Maize meal	Wheat bread	Milled rice			
	--------------------------------- Elasticity ---------------------------------				Fraction	Statistic
Maize	−0.3364 (−2.09)	0.0570 (1.93)	0.0262 (1.57)	−1.5761 (−3.81)	0.1332	0.530
Wheat	.0483 (.31)	−1.3039 (−5.68)	−.0317 (−.26)	.6105 (1.31)	.0224	.814
Rice	.2961 (.59)	−.2088 (−.32)	−.6724 (−1.20)	2.4182 (1.64)	.0042	.623

Notes:
1. The likelihood ratio statistic for the cross-equation restrictions imposed by the Slutsky relationship is 1.82 on three degrees of freedom, which represents a probability of greater than 50 percent.
2. Actual equations estimated were linear; elasticities have been calculated at the mean. T-statistics are shown in parentheses below the elasticities.
3. Consumer prices that appear as independent variables in the equations are generally those reported by the Central Bureau of Statistics that were used in the calculation of the consumer price index for Nairobi. There is a large element of control over these prices as the Government generally enforces maximum retail prices for staple grains.
4. The three equations were estimated simultaneously using Zellner's seemingly unrelated regression technique, while at the same time imposing the cross-equation restrictions derived from the Slutsky relationship.

Appendix table 5—Policy instrument equations, Kenya, maize model, 1964-77

Dependent variable	$E_{t-2}SSP_t$	$E_{t-2}WP_{t-1}$	WP_t	PP_t	Elasticities, calculated at the mean						
					(S_t-S_{t-1})	(S_t-S_{t-2})	(FXR_t-FXR_{t-1})	(FXR_t-FXR_{t-2})	$PL480_t$	UD_t
PP_t	0.041	0.496**	—	—	—	0.037	—	0.090**	—	—
CP_t	—	—	—	1.197**	0.031	—	-0.012	—	0.011	—
(S_t-S_{t-1})	—	—	-0.261	—	1.045**	.135	.058	.721##	.072	-0.745**
M_t	16.292**	-9.717**	-.375	—	1.280**	-.530#	.172	-.723**	.027	1.197**

— = Not estimated.

Notes:

1. See Appendix table 1 for definition of the variables.

2. The elasticities corresponding to (S_t-S_{t-1}), (S_t-S_{t-2}), (FXR_t-FXR_{t-1}), (FXR_t-FXR_{t-2}) and UD_t have been calculated at the mean of the absolute value because the actual means, as deviations from trend, are zero.

3. A single asterisk * indicates a coefficient of the *right* sign and significant at the 5-percent level, and a double asterisk ** at the 1-percent level. The symbol # indicates a coefficient of the *wrong* sign and significant at the 5-percent level, and the symbols ## at the 1-percent level.

Appendix table 6—Policy instrument equations, Kenya, wheat model, 1964-77

Dependent variable	$E_{t-2}SSP_t$	$E_{t-2}WP_{t-1}$	WP_t	PP_t	Elasticities, calculated at the mean						
					(S_t-S_{t-1})	(S_t-S_{t-2})	(FXR_t-FXR_{t-1})	(FXR_t-FXR_{t-2})	$PL480_t$	UD_t
PP_t	0.587**	0.197**	—	—	—	-0.025##	—	0.015*	—	—
CP_t	—	—	—	0.699**	-0.048##	—	0.040##	—	-0.009	—
(S_t-S_{t-1})	—	—	-0.133	—	.178	.397*	.091	-.207	-.108	-0.377**
M_t	18.580**	-9.450**	-.641	—	2.058**	3.096**	-.567	-1.734**	-.289	-.122

— = Not estimated.

Notes:

1. See Appendix table 1 for definition of the variables.

2. The elasticities corresponding to (S_t-S_{t-1}), (S_t-S_{t-2}), (FXR_t-FXR_{t-1}), (FXR_t-FXR_{t-2}) and UD_t have been calculated at the mean of the absolute value because the actual means, as deviations from trend, are zero.

3. A single asterisk * indicates a coefficient of the *right* sign and significant at the 5-percent level, and a double asterisk ** at the 1-percent level. The symbol # indicates a coefficient of the *wrong* sign and significant at the 5-percent level, and the symbols ## at the 1-percent level.

Appendix table 7—Policy instrument equations, Kenya, rice model, 1964-78

Dependent variable	Elasticities, calculated at the mean						
	$E_{t-2}SSP_t$	$E_{t-2}WP_{t-1}$	WP_t	PP_t	(FXR_t-FXT_{t-1})	(FXR_t-FXR_{t-2})	UD_t
PP_t	1.151**	−0.244##	—	—	—	−0.008	—
CP_t	— .	—	—	0.696**	0.098**	—	—
M_t	−.509	2.672##	0.512##	—	−.776**	.084	2.334**

— = Not estimated.

Notes:

1. See Appendix table 1 for definition of the variables.

2. The elasticities corresponding to (S_t-S_{t-1}), (S_t-S_{t-2}), (FXR_t-FXR_{t-1}), (FXR_t-FXR_{t-2}) and UD_t have been calculated at the mean of the absolute value because the actual means, as deviations from trend, are zero.

3. A single asterisk * indicates a coefficient of the *right* sign and significant at the 5-percent level, and a double asterisk ** at the 1-percent level. The symbol # indicates a coefficient of the *wrong* sign and significant at the 5-percent level, and the symbols ## at the 1-percent level.

Appendix table 8—Description of Government pricing policies,
Kenya, 1964-78

Pricing policy and commodity	Ratio	Mean	Linear trend	Overall mean of four countries[2]
Consumer prices:[1]				
Maize	CP_t/PP_t	1.975	0.013	2.409
Wheat	CP_t/PP_t	3.123	−.052	2.937
Rice	CP_t/PP_t	3.633	−.042	3.580
				t-statistic for trend
Producer prices:[1]				
Export crops	r_t[3]	.953	.001	(0.43)
Maize	PP_t/SSP_t	1.151	.007	(1.38)
	PP_t/WP_t	.869	−.026	(−6.04)
	$PP_t/(r_t.WP_t)$	.915	−.027	(−4.56)
Wheat	PP_t/SSP_t	1.073	−.016	(−3.32)
	PP_t/WP_t	1.077	−.012	(−1.55)
	$PP_t/(r_t.WP_t)$	1.131	−.014	(−1.80)
Rice	PP_t/SSP_t	.912	−.006	(−2.15)
	PP_t/WP_t	.645	.004	(− .34)
	$PP_t/(r_t.WP_t)$	.675	−.005	(− .49)

[1]Prices measured in dollars per metric ton.

[2]Simple average of the mean ratios for Kenya, Tanzania, Zambia, and Malawi.

[3]The variable r_t is the ratio of producer prices of export crops to their world prices, f.o.b. Mombasa, weighted by quantities produced, as follows:

$$r_t = (\sum_{i=e}^{2} PP_{it} \cdot QP_{it})/(\sum_{i=1}^{2} WP_{it} \cdot QP_{it}), \text{ where } i=1, 2, \text{ refer to coffee and cotton.}$$

Appendix table 9—Per capita demand elasticities, Tanzania, 1964-77

Crop	Consumer prices			Private consumption expenditure	Expenditure proportion	R²
	Maize meal	Wheat bread	Milled rice			
	------------------------------- *Elasticity* -------------------------------				*Fraction*	*Statistic*
Maize	−0.8978 (−5.88)	0.0299 (.52)	−0.0396 (−.50)	0.8478 (3.42)	0.0924	0.76
Wheat	.1765 (.37)	−2.6043 (−5.32)	.6363 (1.51)	1.4637 (2.52)	.0118	.76
Rice	−.1367 (.59)	.2378 (−.32)	−1.0453 (−1.20)	1.0990 (1.64)	.0332	.70

Notes:

1. The likelihood ratio statistic for the cross-equation restrictions imposed by the Slutsky relationship is 5.78 on three degrees of freedom, which represents a probability of greater than 10 percent.

2. Actual equations estimated were linear; elasticities have been calculated at the mean. T-statistics are shown in parentheses below elasticities.

3. Consumer prices appearing as independent variables in the equations are generally those reported by the Central Bureau of Statistics that were used in the calculation of the consumer price index for Dar-es-Salaam. There is a large element of control over these prices as the Government generally enforces maximum retail prices for staple grains.

4. The three equations were estimated simultaneously using Zellner's seemingly unrelated regression technique, while at the same time imposing the cross-price restrictions derived from the Slutsky relationship.

Appendix table 10—Shortrun supply elasticities, Tanzania, 1964-78

Crop production	Producer prices				Annual growth rate	Partial adjustment coefficient[1]	R²
	Maize	Wheat	Rice	Export crops			
	--*Elasticity*--						*Statistic*
Total:							
Maize	0.359 (3.75)	—	—	− 0.199 (−4.41)	2.91 (2.33)	0.849 (1.07)	0.737
Wheat	.650 (−1.16)	.989 (1.97)	—	— —	1.03 (.40)	.673 (2.90)	.562
Rice	−.328 −1.55	—	.426 (2.39)	−.027 (−.10))	5.12 (5.07)	1.177 (8.76)	.804
Marketed:							
Maize	2.290 (3.26)	—	—	−1.571 (−2.79)	−1.78 (−.63)	.918 (5.38)	.530
Rice	−.954 (−1.77)	—	2.290 (6.11)	−.803 (−1.58)	.83 (.46)	1.077 (7.00)	.818

—=Not estimated.
[1]Coefficient of lagged dependent variable. In econometric terms, 1-d.

Notes:

1. Actual equations estimated were linear; elasticities have been calculated at the mean. T-statistics are shown in parentheses below elasticities.
2. Maize and wheat prices that appear as independent variables in the equations are Government-announced prices prior to planting in each year. Price of export crops is a Paasche index of Government-announced producer prices for coffee and cotton.
3. Marketed maize and rice production and total wheat production correspond to purchases by the National Milling Corporation in each year. Total and marketed maize and rice production equations were estimated simultaneously, for improved efficiency, using Zellner's seemingly unrelated regression technique.

Appendix table 11—Policy instrument equations, Tanzania, maize model, 1964-77

					Elasticities, calculated at the mean					
Dependent variable	$E_{t-2}SSP_t$	$E_{t-2}WP_{t-1}$	WP_t	PP_t	$(S_t\text{-}S_{t-1})$	$(S_t\text{-}S_{t-2})$	$(FXR_t\text{-}FXR_{t-1})$	$(FXR_t\text{-}FXR_{t-2})$	$PL480_t$	UD_t
PP_t	0.680**	0.671**	—	—	—	−0.340	—	0.057*	—	—
CP_t	—	—	—	0.999**	0.011	—	0.003	—	−0.078**	—
$(S_t\text{-}S_{t-1})$	—	—	1.853#	—	.579**	−.043	.218	.730##	−.445##	−0.533**
M_t	5.833	−11.448**	1.238	—	.253	.548	.113	−.484	.678**	1.340**

—=Not estimated.

Notes:

1. See Appendix table 1 for definition of the variables.
2. The elasticities corresponding to $(S_t\text{-}S_{t-1})$, $(S_t\text{-}S_{t-2})$, $(FXR_t\text{-}FXR_{t-1})$, $(FXR_t\text{-}FXR_{t-2})$ and UD_t have been calculated at the mean of the absolute value because the actual means, as deviations from trend, are zero.
3. A single asterisk * indicates a coefficient of the *right* sign and significant at the 5-percent level, and a double asterisk ** at the 1-percent level. The symbol # indicates a coefficient of the *wrong* sign and significant at the 5-percent level, and the symbols ## at the 1-percent level.

Appendix table 12—Policy instrument equations, Tanzania, wheat model, 1964-77

					Elasticities, calculated at the mean					
Dependent variable	$E_{t-2}SSP_t$	$E_{t-2}WP_{t-1}$	WP_t	PP_t	$(S_t\text{-}S_{t-1})$	$(S_t\text{-}S_{t-2})$	$(FXR_t\text{-}FXR_{t-1})$	$(FXR_t\text{-}FXR_{t-2})$	$PL480_t$	UD_t
PP_t	1.267**	−0.306##	—	—	—	−0.001	—	0.020	—	—
CP_t	—	—	—	0.856**	0.046**	—	0.129**	—	0.019	—
$(S_t\text{-}S_{t-1})$	—	—	0.312	—	1.858**	−.316	1.306##	.240	−.302*	0.199##
M_t	−.322	1.449##	.073	—	.219	.070	.299**	−.040	−.020	.364**

—=Not estimated.

Notes:

1. See Appendix table 1 for definition of the variables.
2. The elasticities corresponding to $(S_t\text{-}S_{t-1})$, $(S_t\text{-}S_{t-2})$, $(FXR_t\text{-}FXR_{t-1})$, $(FXR_t\text{-}FXR_{t-2})$ and UD_t have been calculated at the mean of the absolute value because the actual means, as deviations from trend, are zero.
3. A single asterisk * indicates a coefficient of the *right* sign and significant at the 5-percent level, and a double asterisk ** at the 1-percent level. The symbol # indicates a coefficient of the *wrong* sign and significant at the 5-percent level, and the symbols ## at the 1-percent level.

Appendix table 13—Policy instrument equations, Tanzania, rice model, 1964-77

Dependent variable	Elasticities, calculated at the mean									
	$E_{t-2}SSP_t$	$E_{t-2}WP_{t-1}$	WP_t	PP_t	$(S_t\text{-}S_{t-1})$	$(S_t\text{-}S_{t-2})$	$(FXR_t\text{-}FXR_{t-1})$	$(FXR_t\text{-}FXR_{t-2})$	$PL480_t$	UD_t
PP_t	0.885**	0.114	—	—	—	0.015	—	0.020	—	—
CP_t	—	—	—	0.916**	0.016	—	0.050	—	0.002	—
$(S_t\text{-}S_{t-1})$	—	—	−0.219	—	.450**	.629**	.068	−.308*	.251**	−0.309**
M_t	1.601	−.725##	−.125	—	.174	.265	−.220	−.301**	.136	.678**

—=Not estimated.

Notes:

1. See Appendix table 1 for definition of the variables.
2. The elasticities corresponding to $(S_t\text{-}S_{t-1})$, $(S_t\text{-}S_{t-2})$, $(FXR_t\text{-}FXR_{t-1})$, $(FXR_t\text{-}FXR_{t-2})$ and UD_t have been calculated at the mean of the absolute value because the actual means, as deviations from trend, are zero.
3. A single asterisk * indicates a coefficient of the *right* sign and significant at the 5-percent level, and a double asterisk ** at the 1-percent level. The symbol # indicates a coefficient of the *wrong* sign and significant at the 5-percent level, and the symbols ## at the 1-percent level.

Appendix table 14—Description of Government pricing policies, Tanzania, 1964-77

Pricing policy and commodity	Ratio	Mean	Linear trend	Overall mean of four countries[2]
Consumer prices:[1]				
Maize	CP_t/PP_t	2.5987	−0.002	2.4092
Wheat	CP_t/PP_t	2.9140	−.0350	2.9370
Rice	CP_t/PP_t	3.4980	−.0200	3.5800
				t-statistic for trend
Producer prices:[1]				
Export crops	r_t^3	.6830	−.0240	(−5.14)
Maize	PP_t/SSP_t	.9460	.0180	(2.91)
	PP_t/WP_t	.7600	.0230	(8.07)
	$PP_t/r_t.WP_t)$	1.1800	.0890	(6.54)
Wheat	PP_t/SSP_t	.8363	.0001	(.05)
	PP_t/WP_t	1.1520	.0150	(1.15)
	$PP_t/(r_t.WP_t$	1.7610	.1000	(3.47)
Rice	PP_t/SSP_t	.8810	−.0010	(−.94)
	PP_t/WP_t	.6380	.0100	(1.41)
	$PP_t/(r_t.WP_t)$	.9810	.0600	(3.17)

[1]Prices measured in dollars per metric ton.
[2]Simple average of the mean ratios for Kenya, Tanzania, Zambia, and Malawi.
[3]The variable r_t is the ratio of producer prices of export crops to their world prices, f.o.b. Dar-es-Salaam, weighted by quantities produced, as follows:

$$r_t = (\sum_{i=e}^{2} PP_{it} \cdot QP_{it})/(\sum_{i=1}^{2} WP_{it} \cdot QP_{it}), \text{ where } i=1, 2, \text{ refer to coffee and cotton.}$$

Appendix table 15—Impact of Government pricing policies on external trade in food grains, Tanzania, 1964-77

Commodity	Variable	Simulation number[1]	Mean	Linear trend	t-statistic for trend
		Number	*Dollars/metric ton*		*Statistic*
Maize	WP_t/SSP_t	1	1.133	−0.025	(−3.02)
	M_t	1	−183.700	22.100	(2.61)
	M_t	2	47.900	−16.300	(−2.76)
Wheat	WP_t/SSP_t	1	.668	−.006	(−1.29)
	M_t	1	84.600	3.900	(5.71)
	M_t	2	31.500	3.600	(4.09)
Rice	WP_t/SSP_t	1	1.412	−.015	(−.92)
	M_t	1	−69.900	2.700	(.80)
	M_t	2	21.600	1.100	(−1.21)

Definitions: M_e: net imports, WP_t: world price, SSP_t: autarky price.

[1]See text, p. 49.

Appendix table 16—Food grains: Total production and share marketed through ONCAD, Senegal, 1973-77

Crop	Unit	1973	1974	1975	1976	1977
Millet/sorghum:						
Production	Tons	322,900	510,800	717,000	715,000	554,000
Quantity marketed by ONCAD	Tons	21	29,969	35,969	12,125	10,000
Share marketed by ONCAD	Percent	0	6	5	2	2
Rice:						
Production	Tons	43,600	64,300	117,000	140,000	112,400
Quantity marketed by ONCAD	Tons	0	1,006	3,612	NA	NA
Share marketed by ONCAD	Percent	0	2	3	—	—
Maize:						
Production	Tons	20,200	33,800	43,200	45,000	47,200
Quantity marketed by ONCAD	Tons	5	14	378	147	NA
Share marketed by ONCAD	Percent	0	0	1	0	—

NA=Not available.
—=Negligible.

Source: *(12)*.